ckaging Show Report

JUNE 1955

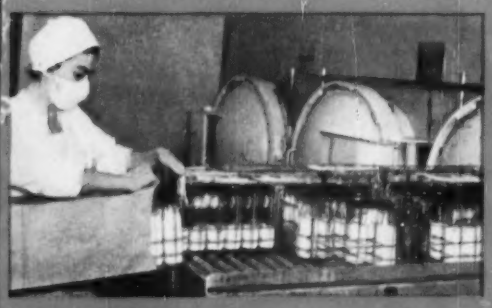
35 CENTS

FOOD ENGINEERING

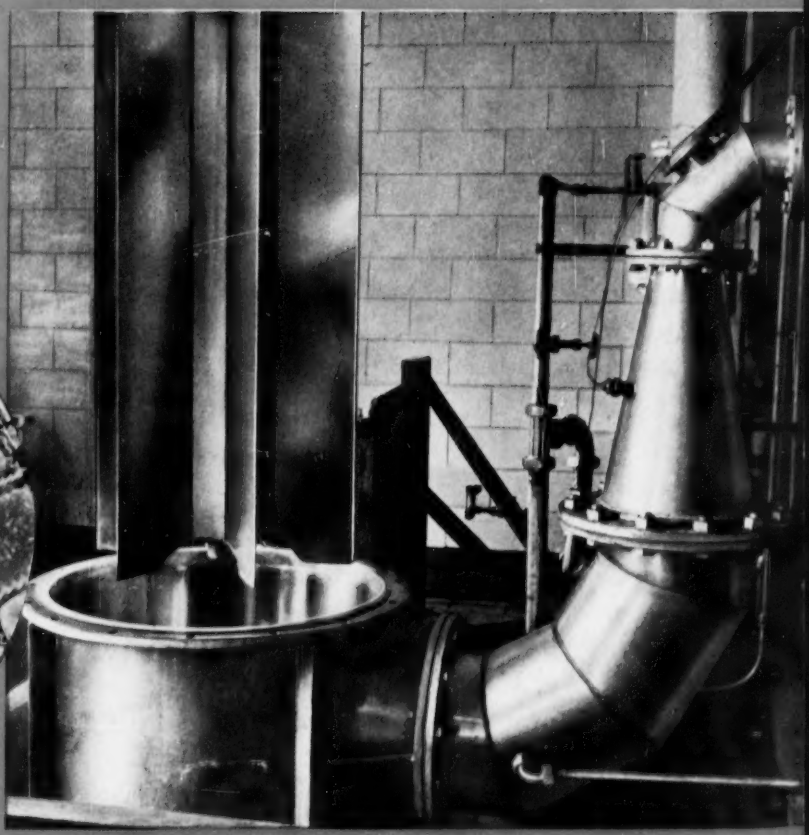
A McGRAW-HILL PUBLICATION

MATERIALS HANDLING • Gallon jar caser permits closer inspection. p. 97

QUALITY CONTROL • Quick frozen candy can be better than fresh. p. 74



PRODUCTS • Infant-formula success forces modernization of factory. p. 71



ENGINEERING • Viscous products pass readily through agitator type vacuum evaporator for high efficiency and quality. p. 64

ALSO: PACKAGING • SANITATION • PROCESSING MAINTENANCE • TRANSPORTATION • INSTRUMENTS INGREDIENTS • PERSONNEL

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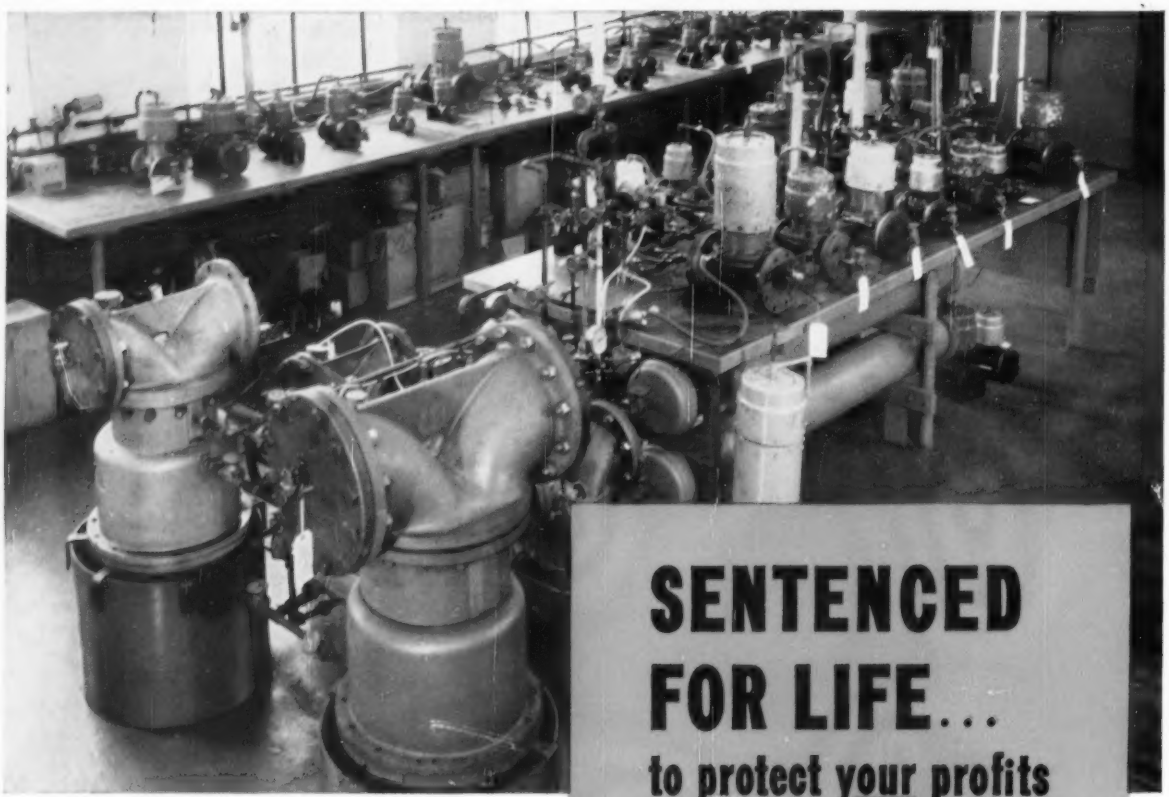
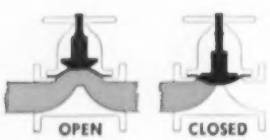
INQUIRY COUPON INSIDE BACK COVER



Valve diaphragms being tested for flex-life in a section of Grinnell's extensive Testing Laboratory.

SENTENCED FOR LIFE...
to protect your profits

Rubber mill for mixing experimental diaphragm compounds.



Check these important features:

- Diaphragm absolutely isolates working parts from the line fluid.
- Diaphragm lifts high for full, streamline flow in either direction.
- Diaphragm effects positive, leak-tight closure.
- Body, lining and diaphragm materials to suit service.
- Diaphragms easily replaced without removing valve body from line.

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This program of continuous testing is the basic reason why so many different industries are turning to Grinnell-Saunders for diaphragm valves with *pre-proved* performance. There are standard types for a wide variety of applications . . . in the handling of corrosive liquids, gases, beverages, compressed air, fluids loaded with suspended solids — on lines where leakage, corrosion, clogging, abrasion, or contamination could be costly.

Are your valves giving you the dependable, long service life you must get to maintain economy and efficiency? If they are not, it will certainly pay you to consult a Grinnell engineer.

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June 1955

Volume 27 Number 6

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FOOD ENGINEERING

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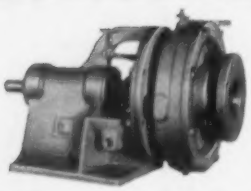
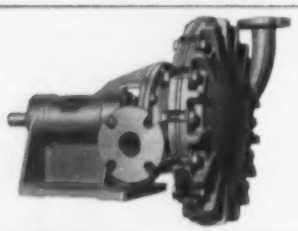
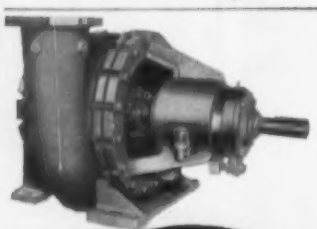
		APPLICATION	TYPE	SIZE RANGE	SPECIAL FEATURES
	Frame Mounted: Bulletins 52B6351, 52B6105 Close Coupled: Bulletins 52B6083, 52B6140	General purpose use.	**SSB** Single Suction, Frame Mounted, Grease Lubricated. Also available close coupled.	Heads to 550 feet. Capacities to 3500 gpm. Temperatures to 250 F.	Available in many materials. Choice of packing, single or double mechanical seal.
	Bulletin 52B7638	Chemical and general purpose use in medium high temperature range.	**SSB** Single Suction, Frame Mounted, Oil Lubricated.	Heads to 250 feet. Capacities to 3500 gpm. Temperatures to 550 F.	Available in many materials. Choice of packing, single or double mechanical seal. Stuffing box cooled above 250 F. Bearings protected from corrosive or abrasive laden atmosphere.
	Bulletin 52B6615	Handling fine abrasives in suspension or corrosive liquids.	**P and PD** Single Suction, Frame Mounted, Grease Lubricated.	Heads to 260 feet. Capacities to 1300 gpm. Temperatures to 250 F.	Stuffing box on suction side. Choose packing, mechanical seal or *Equiseal* stuffing box—stops leakage to 15 feet suction head. Open or closed impeller.
	Bulletin 52B7112	Handling fine and coarse abrasives in suspension or corrosive liquids. For larger rating than PD pumps.	**PW** Single Suction, Foot Mounted, Oil Lubricated.	Heads to 260 feet. Capacities to 10,000 gpm. Temperatures to 250 F.	Available in extra-hard materials. Has thick metal sections to withstand abrasion. Easy to disassemble for inspection and cleaning. Open or closed impeller.

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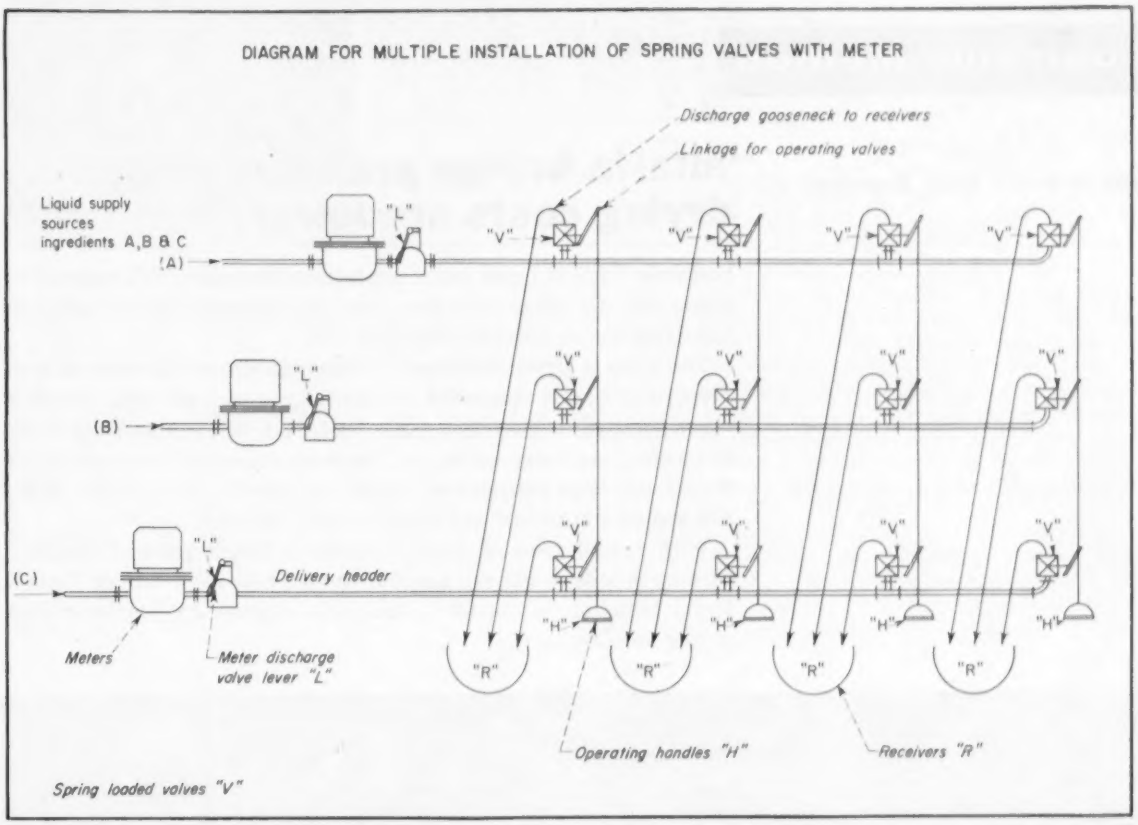
PRACTICAL IDEAS



Measuring Problems and Solution

Problem of proportioning three liquid ingredients into several receivers was solved by a system of spring loaded valves, at the Post Cereals Division.

To begin with, frequency of receiver batch operation eliminates the possibility of using gate valves to select the proper receiver. There is also the possibility that gate valves would not always be turned off after the required quantities are delivered, so the following batch might be delivered into the receiver "short measured."

Spring loaded valves (V's in sketch) were tried, and they solved the problem. Use of spring loaded valves ("V") also eliminates 12 meters which would otherwise be required.

As system developed, each of three ingredients—A, B, and C,—was provided with a meter.* Delivery side of these meters was connected to a header serving each of four receivers. The spring loaded valve was placed directly over each receiver and provided with a vertical loop, or gooseneck, for delivering ingredient from top of valve into receiver. Each of the three ingredient-loaded valves was linked together so when this linkage was held down by handle ("H"), it operated to open all three valves at the receiver. Purpose of gooseneck in top of spring loaded valve is to prevent draining of the header after required quantities had passed through meter and meter valve had closed.

Liquid ingredient measuring equipment operates as follows:

Required ingredient quantities are set up on each of three meters—A, B, and C. Discharge valve lever ("L") for each meter is then tripped. Operator pulls and holds the handle ("H") on spring valve linkage over the receiver that is to be used. Liquids will flow until the three meters shut off. When the last meter shuts off, operator releases handle on spring valve linkage, allowing these valves to return to closed position. System is then ready for operator to set up quantities on three meters again and to fill another receiver.—*GF Technical Bulletin, General Foods Corp., White Plains, N. Y.*

* Neptune Auto-Stop Meter

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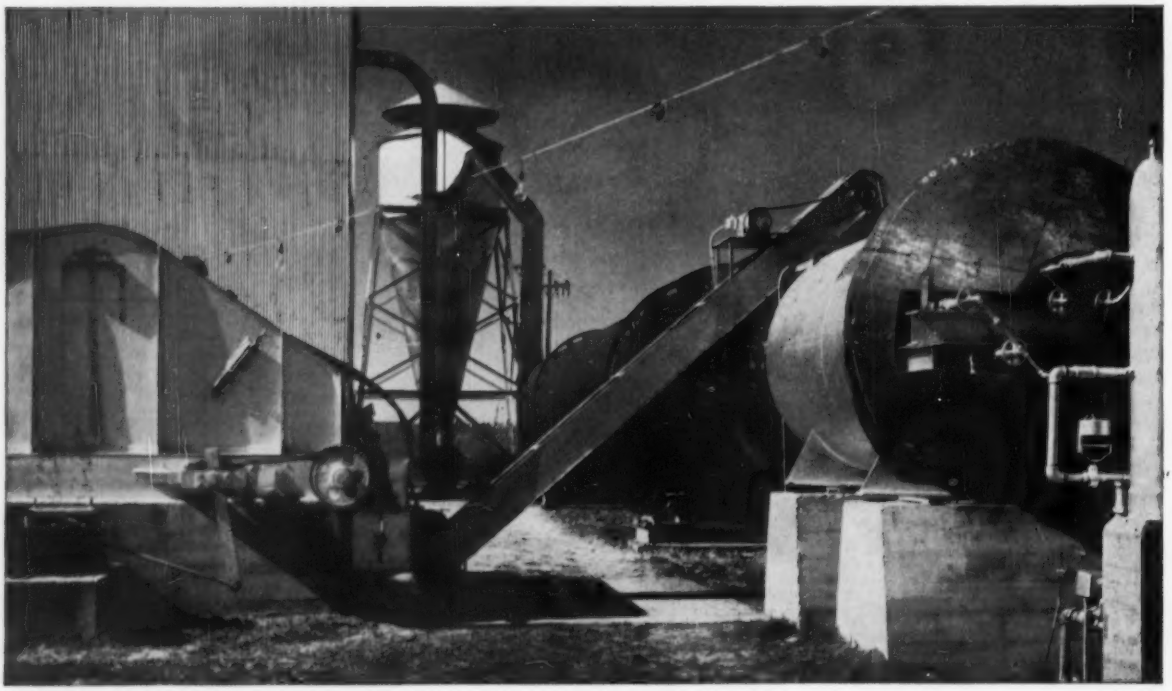

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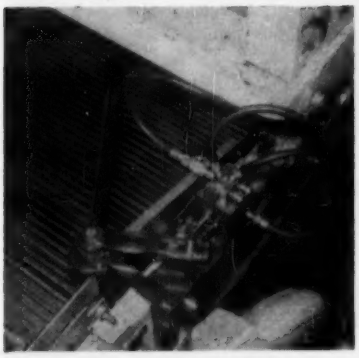
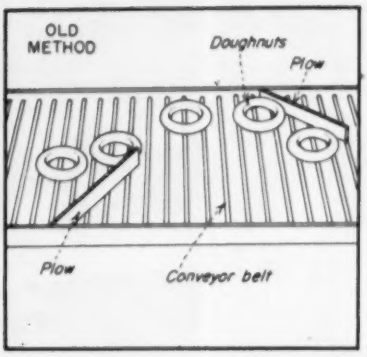
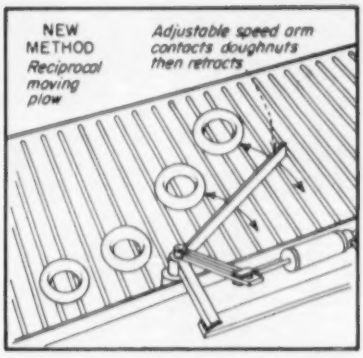






Improved Conveyor Plow

We ran into real difficulty with freshly-topped chocolate-iced doughnuts feeding from an automatic top icer onto a metal conveyor drying belt several hundred feet long.

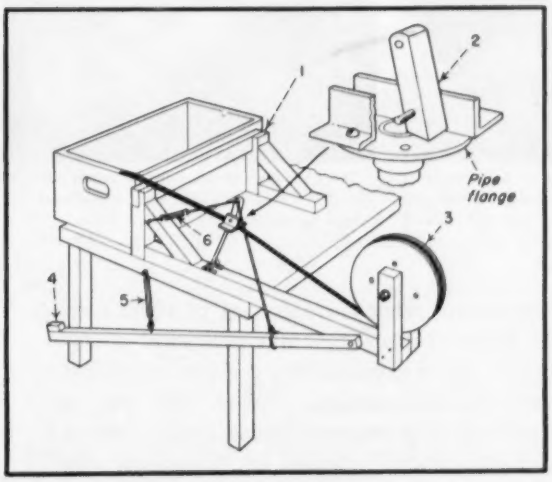
The doughnuts covered the entire area of the belt, which conveyed them from the icer, and therefore did not allow room for feeding of another item onto the belt further along the line. It therefore became necessary to realign approximately half of the doughnuts so that they would occupy only one-half of the width of the belt.

Now the customary method of moving doughnuts or any other bakery items for that matter on conveyor belts for relocating the stream is to use metal plows (see left sketch).

This method we found to be unsatisfactory in this particular case because in a very short time the plows became completely fouled up with icing. Then, as doughnuts rolled along the plow the icing was marred and in some cases the doughnuts would even stick to the plow.

To overcome this difficulty we installed a double action air cylinder reciprocating type plow approximately 30 in. long with three graduated horizontal stainless steel rods receding to the top to fit the contour of the doughnuts. Thereby the contact between the plow and the doughnut usually was below the icing line.

As this new type of plow oscillates, it moves doughnuts into new position with only momentary contact with the pastry. Therefore icing is left intact and practically no deposit of icing is left on the plow.—*Lawrence Flowers, Plant Engineer, Emil Doughnut Corp., Chicago.*



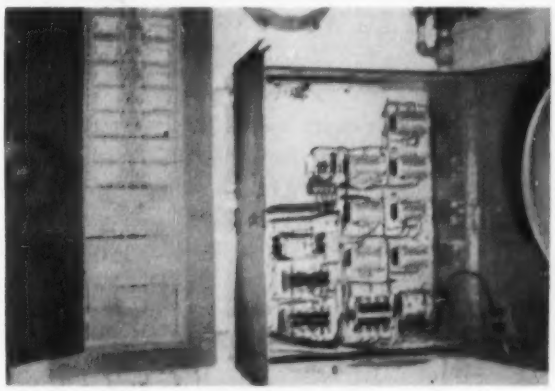
Home-Made Case Strapper

The first step in construction of a very efficient and inexpensive case strapper is to build a backrest (1) in sketch—on a work bench. Next added is a hinged arm (2) with an offset dog, located an inch lower than the shortest side of the case to thus enable the strap to be held down.

Then onto an extension of the base to which the hinged arm is attached, is mounted a pair of uprights between which the strap holder or spool (3) on a metal axle is inserted.

Now, when an operator presses down on the pedal (4), the dog (2) grabs the strap firmly so that it may be pulled taut over the case edge. Case is rotated so that the strap can be tightened and nailed to each side until strapping is complete.

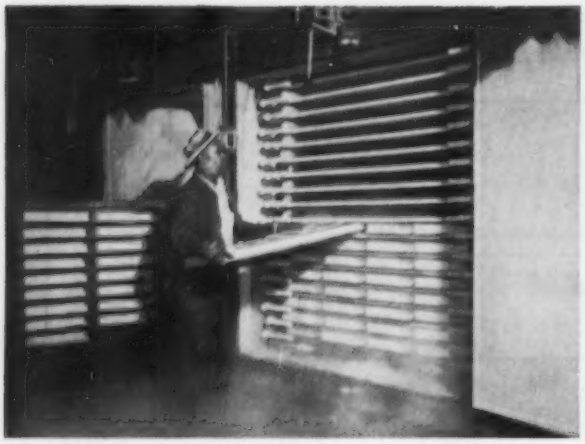
When foot pressure is released springs (5 and 6) slack off pressure on the dog, thus relieving the grip and tension on the strap so that it is free to move as the case is turned from side to side.—*George Steres, Production Manager, Pepsi-Cola Bottling Co., Sacramento, Calif.*



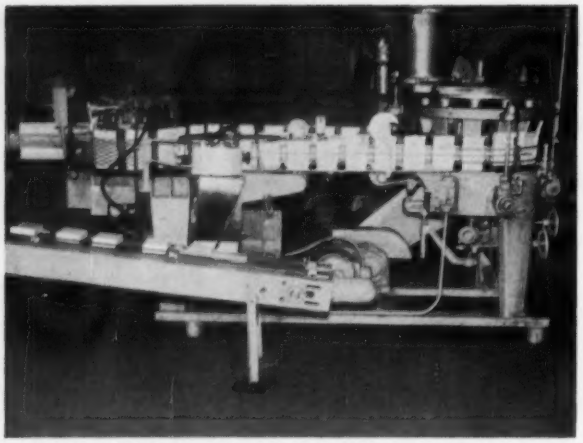
Centralized Control

In planning our New Plant, built in 1950, we did not want walls of our processing room lined with individual motor starters. So, we located a steel cabinet in one corner on the wall, adjacent to the power entrance and fuse panel for the processing area.

All motor starters and overload relays were placed in this cabinet. Each one is identified with a label to facilitate service in case of trouble. Each fuse block is also a cut off switch for each motor on circuit, so if difficulty is encountered we can cut off power to the circuit, check fuses and heaters all at one point.



The Articold Package Freezer is extremely compact and efficient, freezes faster than blast tunnels at greatly reduced cost.

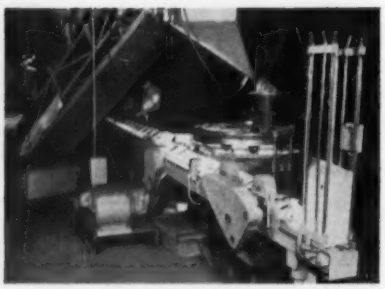


FMC Mara-Pak Carton Filler—automatic filler for free-flowing granular products in end-opening cartons. Fills up to 250 cartons per minute.

Famous *fmc* filling and freezing equipment cuts costs, speeds output of premium quality frozen foods

Uniform fast-freezing (up to 300 cpm) captures natural fresh flavors in the FMC Continuous Round Shell Can Freezer.

FMC — M&S Plunger Fillers set new standards for high speed, high accuracy filling and product versatility.



There are high speed, fully automatic FMC fillers for filling consumer and institutional size top-opening cartons.

These and other highly specialized FMC machines have literally shaped the profit-building production methods of leading frozen food plants everywhere. This FMC equipment includes several basic models of high capacity fillers for all types of containers; can freezers to meet the ever-increasing popular demand for a variety of frozen canned foods; package freezers for quick, even freezing at extremely low cost.

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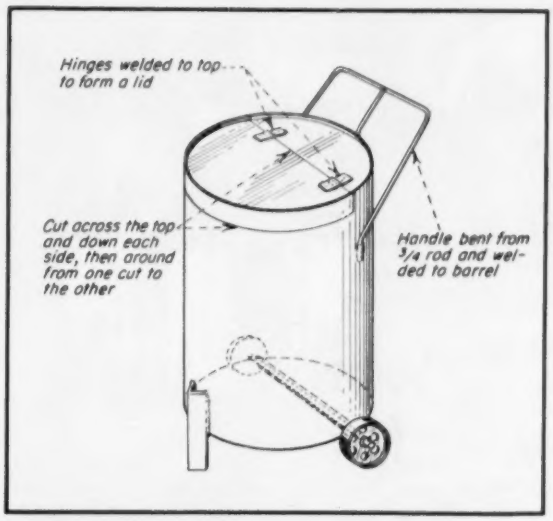
Being able to do these three things at one location speeds getting equipment back in operation. It also makes for better general appearance and facilitates the washing of the tile walls.—*Frederick Anderson, Partner, Anderson Dairy, Coldwater, Mich.*


Hinges welded to top to form a lid
Cut across the top and down each side, then around from one cut to the other
Handle bent from ¾ rod and welded to barrel

Mobile Trash Can

A container on wheels for collection of trash may readily be made as follows:

Start with a 50-gal. steel barrel (see sketch) with both heads intact. With a torch make a cut across the top of the drum to one side of center. Then extend this cut across barrel top and down sides on both ends of cut about 3 in. Final cut is made horizontally around the drum connecting the ends of the two vertical cuts so that the detached portion is larger than the section remaining intact on the container.

Next hinge the cut-away section on top of the drum to form a lid which can be lifted to admit trash. Resulting construction of the lid provides reinforcement on the side which makes the lid very sturdy.

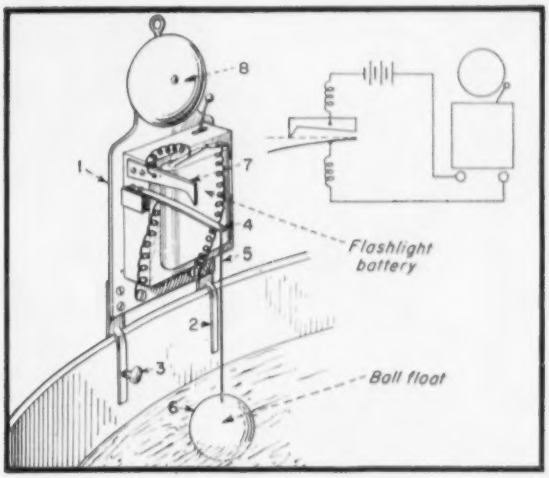
Drum is then mounted on wheels obtained from a discarded hand truck. The axle between the truck wheels is a ½ in. rod which provides very little area on which to weld the axle to the barrel. Therefore, the axle is welded in the angle section of a piece of 1½ in. angle iron. This not only provides the required welding surface for attaching the barrel rim, but also strengthens axle.

Now to the barrel side at bottom is added a two-inch angle iron with the flanges next to the barrel to form a pocket. This attachment serves a dual function. It makes the third leg of a three-point support for the drum when stationary and also makes a pocket or socket in which the handle of a cleaning broom may be inserted.

Using ¾-in. round rod a handle is next bent and welded to the barrel side to provide a means of tilting the container and propelling it. When tilted back on the wheels trash barrel rolls very easily and can be either pushed or pulled.

These portable trash containers are inexpensive to construct. They have an advantage over stationary trash cans in that often it is expedient to bring the trash container to the trash, rather than the trash to the container.

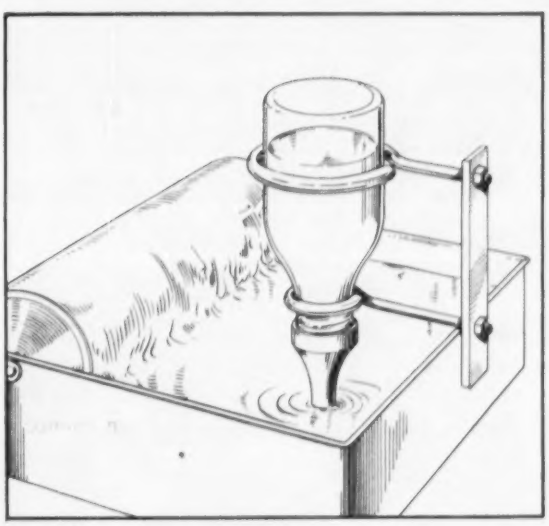
Mobile units are easily moved to the incinerator when full and do not require that the contents be transferred to a pick-up wagon or wheel barrow or of the other conveyances often used when trash cans are stationary.—*William Morgan, Jr., Brockton, Indiana.*



Simple Liquid Level Control

Attach to base of electric door bell (1) a pair of split legs, (2) to fit over edge of vessel in which top level is to be controlled. Now tap, and thread a pair of the legs on one side of vessel for a pair of set-screws (3) with which to secure device in place.

Next on the end of a pivoted arm (4) attach a chain (5) or rod, on end of which a float (6) is secured. Electrical contact is made through pivoted arm and a fixed wired arm (7) above it. These two meet when float has arrived at cut-off level and thus close circuit of battery powered bell (8) which then sounds an alarm to summons an attendant.—*Ing Roland Holndahl, Orgnatan 1, Molndal, Sweden.*



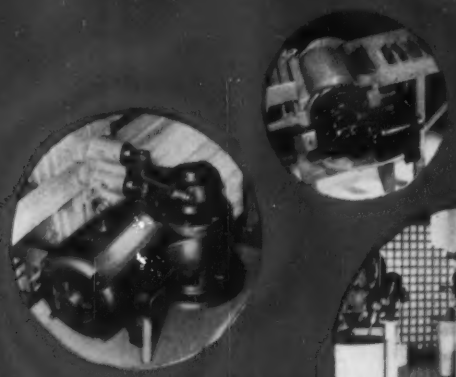
Old Principle, New Use

More than one benefit may be derived from a simple adaptation of the chick watering trough principle to packaging or case-sealing-machine glue pots. Among advantages are these:

1. Capacity of small, shallow pots can be greatly increased.

2. Size of pots and glue content can be reduced to improve action of fast-drying glues.

3. Frequency of pot refilling can be reduced to relax operator vigilance for other occupations.



What do you need in your electric motor drives . . . gear reduction . . . electric brakes . . . variable speed operation . . . fluid drive . . . special mountings or does a standard motor (like the 200 HP synchronous motor shown below) best suit your needs? Whatever it is, check with Master first. We offer you the widest selection of electric motor drives in the nation.

In thousands and thousands of ratings, ⅛ to 400 horsepower . . . in open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 430 to 1 ratio . . . with either magnetic or dynamic type electric brakes . . . with fluid-drive . . . with mechanical or electronic variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best power drive for you.

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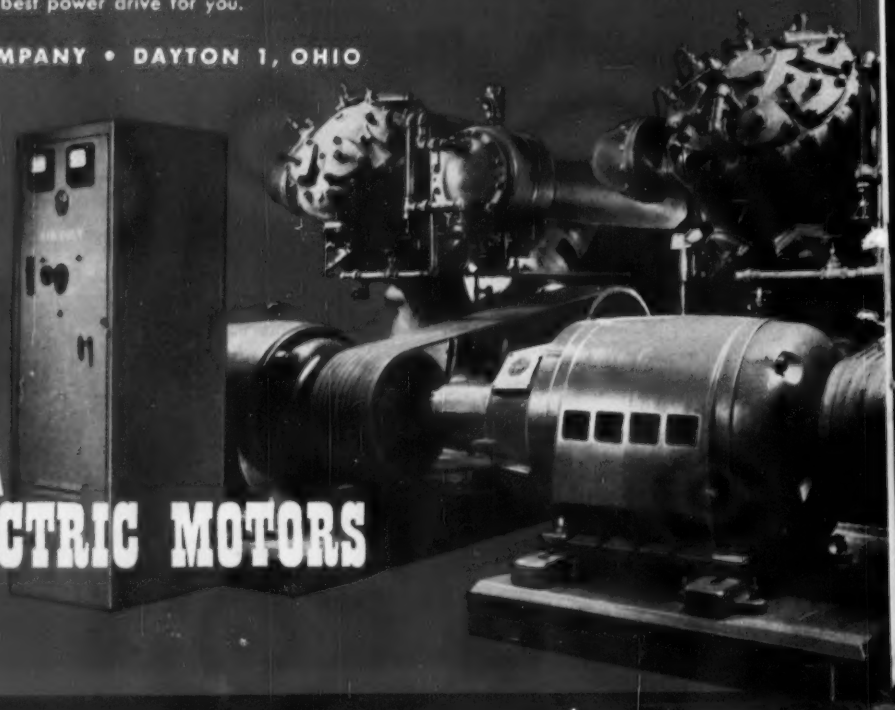
THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO



MASTER

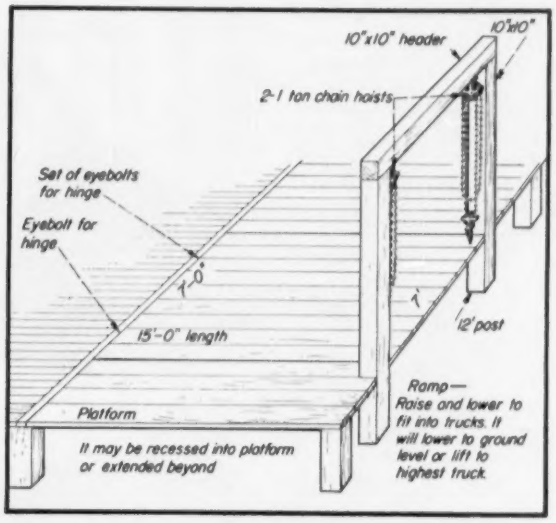
ELECTRIC MOTORS

4. Maintenance of constant head improves glueing and assures more uniform application.

5. Aids in supplying reservoirs that are remote.

All that is necessary to prepare the unit is to obtain a common motor oil bottle (see sketch), make a bracket support into which jar may be dropped when filled. Bracket may be attached to jar or to machine.

Two bottles for each station will facilitate the operation.—*Paul W. Anderson, Technical Service, H. B. Fuller Co., Chicago.*


10"x10" header
10"x10"
2-1 ton chain hoists
Set of eyebolts for hinge
Eyebolt for hinge
1'0"
15'-0" length
12' post
Platform
It may be recessed into platform or extended beyond
Ramp—
Raise and lower to fit into trucks. It will lower to ground level or lift to highest truck.

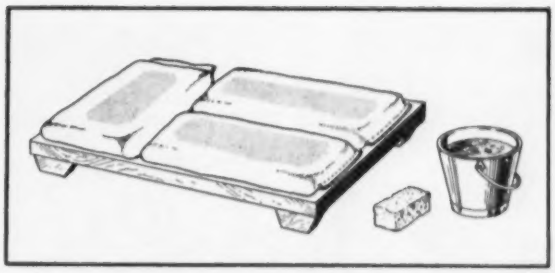
Adjustable Loading Dock

Here is a method of constructing a loading dock section which can be raised or lowered to meet the requirements of loading or unloading any vehicle.

The loading dock is approximately the height of the average truck (see sketch). At the dock side two 10x10 in. posts, 12 ft. long are erected, topped by a 10x10 header. These are spaced far enough apart to permit a 7 ft. wide, 15 ft. long platform to be elevated or lowered between them. Suspended from the header on both sides is a one ton chain hoist lower end of which is attached to the free end of the 7x15 platform. Opposite end of this platform is hinged with a set of eye-bolts.

This arrangement permits lowering the adjustable dock to any height for tractor or trailer loading or unloading. The platform can also be lowered to ground level for use of industrial and hand trucks.

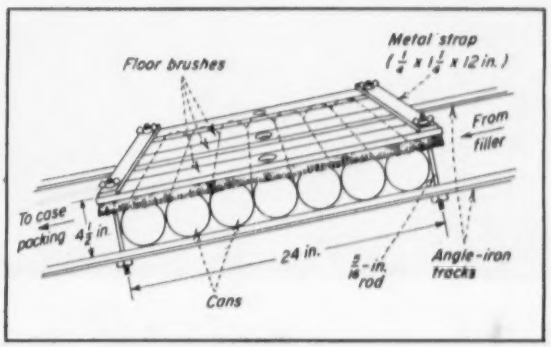
Initial cost is reasonable, maintenance negligible. The arrangement is so efficient that we have installed four of them.—*Otty R. Stockford, Vice-President, Hannaford Bros. Co., South Portland, Maine*



To Anchor in Place—Just Wet

A simple method for preventing paper multi-wall bags from shifting when stacked is to wet top of each bag with a damp sponge before placing next bag on top.

This method will actually cement the bags together in many cases, without damage to the bag or to contents of bag. Though the bags are anchored in place removal of them is very simple and easy. A slight tug will snap the bag loose.—*Charles Henkman, Jr., Instructor, American Institute of Safety, Chicago, Ill.*



Floor Brushes, Dust Cans

In the process of machine-filling milk solids into 2½-lb. capacity cans, milk dust accumulates on the outside of the containers. As a result, it was necessary for a worker to wipe this dust off the cans before packing them into shipping cases.

To eliminate this time-consuming task, three 2-ft. floor brushes were installed directly over a 2-ft. wide angle iron track over which the sealed cans rolled on their way to the case-packing station. These brushes are spaced 4½ in. above and parallel with the can-carrying track. Ends of the brushes are bolted to a pair of metal strips (¼x1¼x12 in.) and at right angles to the track. Each strip is thumbscrew secured to two vertical rods (⅝x5 in.) and fastened at the bottom ends to the angle irons.—*Dean Milk Co., Rockford, Ill.*

CAN YOU USE $50?

Then here's an opportunity to get it.

Send one of your ideas to FOOD ENGINEERING.

Each month $50 is presented to someone like you for the best item in this department. And the chance that it will be you is now running about one in twelve.

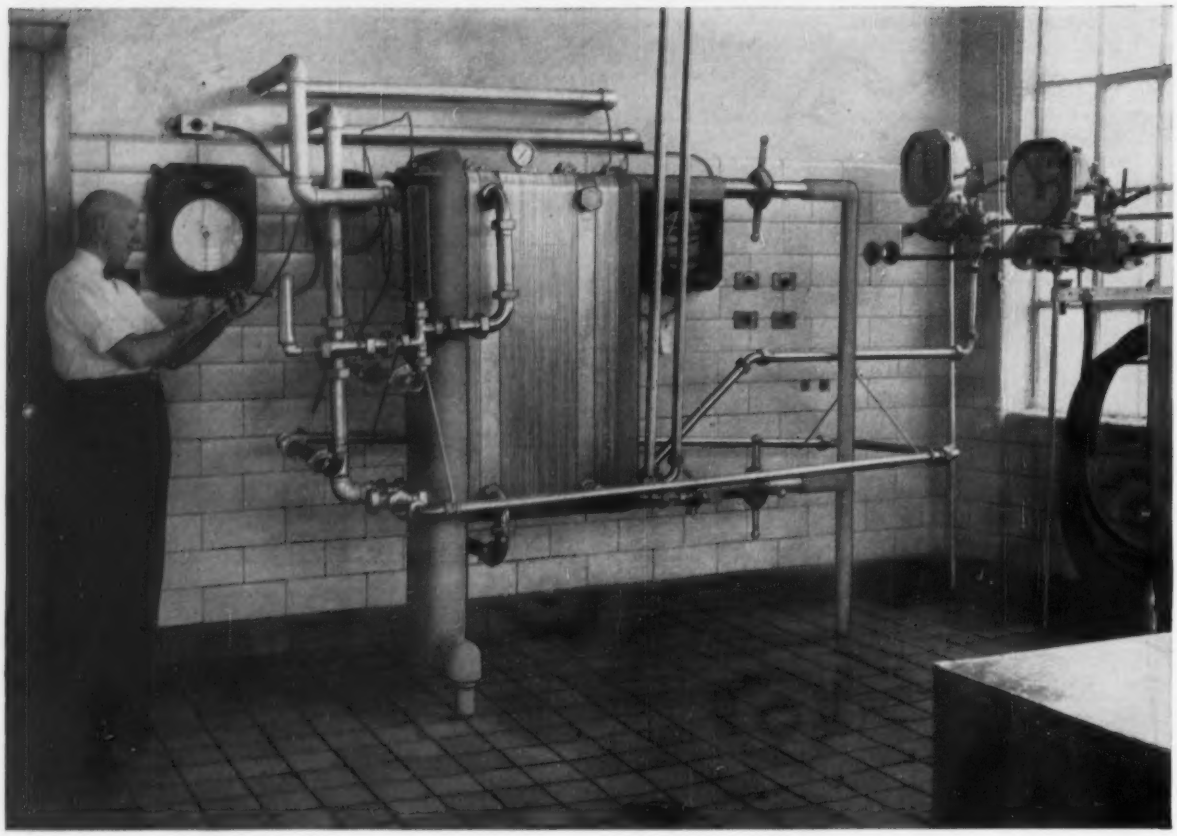
Also $5 to $15 is paid for each contributed item used. So a few minutes time may net you as high as $65.

Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

We'll do the finished writing and drawing for you.

Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

APRIL PRACTICAL IDEA WINNER was "Improves Colony Counting," submitted by Kenneth M. Rowell, The Exchange Orange Products Co., Ontario, Calif.



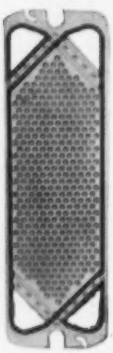
He's keeping tabs...but on what product...what process?

Here You Can't Tell what's going on inside this Cherry-Burrell "Superplate" heat exchanger. From where you sit, the *product* and the *process* could be almost anything.

That's just the point. "Superplate" handles so many products so efficiently that this operator could be taking a reading on *any* of those liquids listed at the right.

Versatile in handling products? Yes. And "Superplate" is just as versatile in processing operations, too. You can use it as a heater, as a cooler, a regenerator or Shortime pasteurizer.

And no matter *how* you use "Superplate" . . . or on *what* . . . it's bound to speed processing operations, lower water, refrigeration and steam costs and help you produce a better product . . . for less money, and in less space.



Here you can see why you get better heat transfer

Exclusive Electropolished Plates of 304 or 316 stainless steel give greater resistance to water deposits; eliminate sticking of solids.

3-D Turbulence set up by patented knobbed design accelerates heat transfer with low pressure drop.

Nonclogging Flow Space between plates, full length.

Largest Port Areas of any plate for low product and heating or cooling media pressures.

Here you have some of the products "Superplate" handles

Amino Acids	Condensed Milk	Ice Cream Mix	Soy Bean Concentrates
Apple Juice	Cottonseed Oil	Liquid Sugar	Vegetable Juices
Bottled Water	Cream	Milk Products	Vinegar
Baby Food	Edible Oil	Salad Oil	Whey
Chocolate Liquor	Eggs	Soda Syrup	Wine
Citrus Juices	Eggnog	Soups	Wort
Clam Juice	Fruit Juices	Sour Cream	
Coffee Extract	Grape Juice		

ASK THIS MAN

—your Cherry-Burrell Representative—about our complete "Superplate" service. Includes design, installation and supervised operation of the versatile plate-type heat exchanger that's best for your process, your product, your plant.

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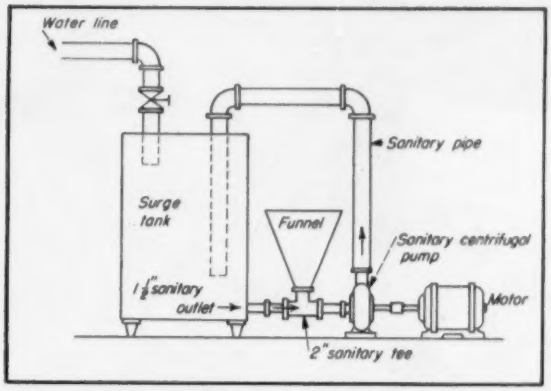


Way to Reconstitute Milk Powder

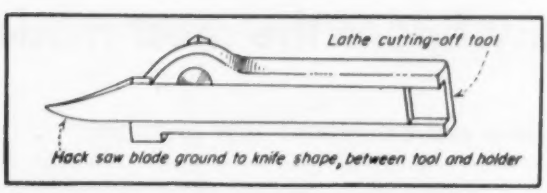
Here's an easy way to assemble equipment for efficient reconstituting of milk powder, and also procedure to follow to obtain best results.

Needed are a pump and motor, surge tank and sanitary fittings, all standard equipment. Only accessory necessary to build is a funnel (see sketch) made of sanitary metal and attached to the middle leg of a sanitary 2-in. tee.

This funnel and tee group is located between and coupled to pipe discharge of surge tank and intake of pump. However, end of the tee toward tank is bushed down to 1½ in. which is also the diameter of outlet pipe from tank. When inlet pipe to tee is smaller than outlet pipe to pump, a greater turbulence results where the dry milk and water meet than if both pipes are the same size. Providing this turbulence speeds rate at which dry milk is drawn from funnel into liquid.

Now, to operate system first start pump, and only then add water to surge tank. This prevents water from rising in funnel and wetting the sides, causing dry milk to stick.

Amount of water to be used is predetermined by solids wanted in the liquid. After measured amount of water is in surge tank, just scoop required amount of dry milk powder into funnel and a liquid milk readily and thoroughly reconstituted will result.—*Rudy Schweiss, Maintenance Supervisor, Spencer Milk Products, Spencer, Wis.*



To Machine Rubber Easily, Freeze It

A very difficult situation which arose in our plant recently was corrected we believe in a very unique manner.

We found it necessary to machine six soft rubber inking rolls in order to fit them into the case printer. Since the rolls are very soft, attempts to turn them in a lathe proved unsuccessful. Then it was decided to try freezing the rolls in order to harden them for turning. This proved to be efficient and successful.

Here is the way in which we were able to freeze rubber rolls sufficiently to withstand two turning operations.

First, a length of pipe was selected with a diameter approximately 2 in. greater than that of rolls, thus providing a clearance of an inch between pipe and roll when the latter was placed inside the pipe. Then, space between rolls and pipe was packed with dry ice. A cannister, fiber tube or roll of corrugated paper fabricated from discarded cases serves equally well we later discovered.

Care should be taken not to tamp dry ice around the roll since pieces of dry ice will dent the rubber freezing it with an irregular surface. Instead, merely drop dry ice already broken into small pieces in the space between roll and container. Approximately 45 min. is sufficient for freezing a 4½ in. diameter rubber roll.

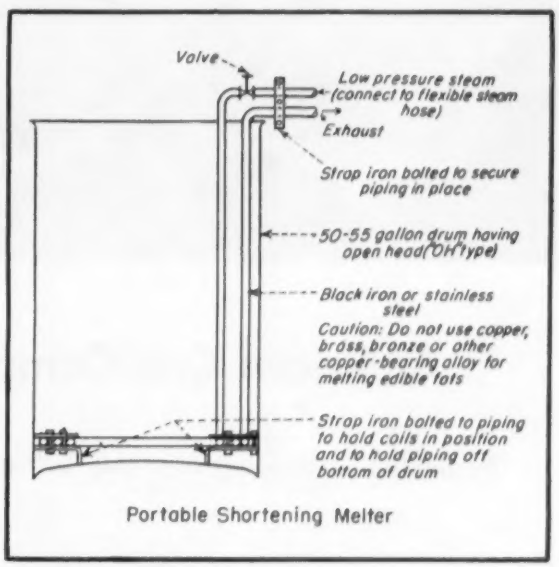
Once rubber is frozen solid, the roll can be turned on a lathe using sharp, well honed tool bit with a medium speed and very heavy cut and feed. We were able to reduce the diameter of our rolls ½ in. in two passes without having to re-freeze the unit.

Make sure that cutters are clean and also have the two stops set, as well as the load clog on the shaft before freezing. This will save time and keep thawing of rubber to a minimum.

Here is another suggestion. Be sure to handle the dry ice and also the frozen roller with gloves, preferably asbestos ones.

Now when it comes to cutting to length, this operation can be done either before or after freezing. Procedure does not require that roll be absolutely hard.

There is also an easy way to make a cut-off tool. Just grind a hacksaw blade to shape of a knife blade and slip it in a cutting-off tool holder alongside the cutting off tool. This makes a good support and by using a little water to lubricate during cutting the tool works very well.—*Robert M. Stewart, Maintenance Machinist, Hunt Foods Inc., Puyallup, Wash.*

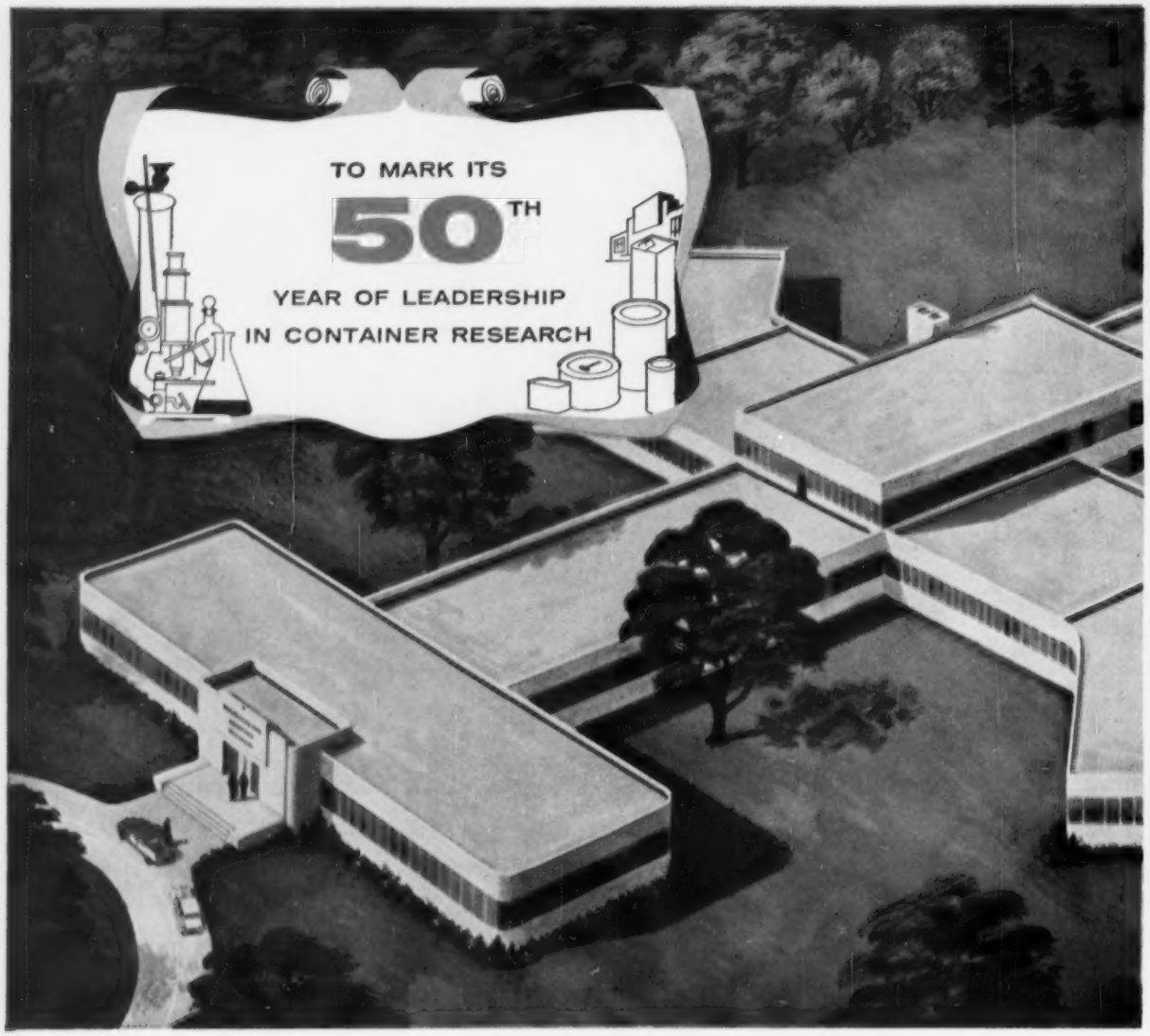

Valve
Low pressure steam (connect to flexible steam hose)
Exhaust
Strap iron bolted to secure piping in place
50-55 gallon drum having open head (OH type)
Black iron or stainless steel
Caution: Do not use copper, brass, bronze or other copper-bearing alloy for melting edible fats
Strap iron bolted to piping to hold coils in position and to hold piping off bottom of drum
Portable Shortening Melter

Fuse Testing Speeded

Here is a simple arrangement which provides a safe and rapid method for testing fuses, with a range up to 60 amperes.

All that is necessary is to lay the fuse on top of the contact posts (see sketch) made from fuse clips and then plug the unit in on an electric outlet. If the fuse is good, the light bulb in the circuit flashes, while if the fuse is burned out the light bulb will not be lighted.

The testing unit is easily constructed and is inexpensive. —*William Walima, Rockport, Mass.*



American Can Company opens the most modern

Dedicated to creating cans that will add new convenience to your products

This new research center is the latest link in the chain of progress which began with Canco's container research laboratory—the first in America—which was opened in 1906.

Through Canco research have come such important developments as the doubletite paint can, the motor oil can, the non-drip liquid detergent can, and new packages for drugs, medicinals, insecticides, blood plasma, and a host of other products.

The shape of cans to come

Who can even venture to guess what new miracles will be born at Barrington? For here, Canco's creative scientists will have the finest equipment and the most up-to-the-minute facilities of any container laboratory in the world.

Many dreams are already taking shape under our new roof. Studies are progressing in the use of atomic energy in the "cold sterilization" of foods.

For more information, use coupon on last page.

AMERICAN CAN COMPANY RESEARCH CENTER—BARRINGTON, ILLINOIS

research center in the can-making industry

Accomplishing the "impossible"

Even more dramatic is the search for ways to make tin cans *without tin* . . . America's major source of tin lies directly in the path of current aggressors.

The problems are staggering—but the results will be even more so. We call this vitally important program *Operation Survival*—a name which may one day mean exactly what it says.

"Good" isn't good enough

Experience has taught that no container manufacturer can hope to make significant contributions to the nation's economy without constant research advancement. The good ways are not necessarily good enough. The formula for growth is constant change, constant improvement, constant search for new and better containers.

It is to this kind of change that Canco's new Barrington Research Center is dedicated—to provide still better packaging for the products of America's agriculture and industry.

Go First to the People Who Are First!

AMERICAN CAN COMPANY

CANCO

New York, Chicago, San Francisco

For more information, use coupon on last page.

Turning out a sweet job *in tandem!*

The high quality of the famous Hershey Chocolate Bar is known far and wide. And, into the maintenance of that product's well-deserved popularity, goes the processing of just the right kind of sugar.

In the Hershey Chocolate plant eight No. 4TH-MIKRO-PULVERIZERS set up in tandem units, turn out tons of sugar per hour, reducing it to the required degree of fineness.

It was found that this dual-pass method reduced power consumption and operating time—while delivering at the same time a product which solved other problems in the subsequent processing of the chocolate.

A major part of all the sugar in the world is ground in MIKROS. So too, MIKROS have provided the answer to a great majority of food processing operations where grinding, blending or granulating of fine or ultra-fine powders is required.

The MIKRO area of distinguished service extends far beyond the food field. It also embraces the processing of chemicals, pharmaceuticals, cosmetics, soaps, fertilizers, plastics and many other products and materials.

Submitting your grinding or dust recovery problem to the MIKRO Laboratory involves no obligation on your part. But, the answer provided may be just the right answer for you.

Write for illustrated descriptive bulletin

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PULVERIZING MACHINERY DIVISION
METALS DISINTEGRATING COMPANY, INC.
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YALE meets every handling need in the food industry with the most complete line of industrial trucks available—in every practical capacity—with attachments to handle all types of containers: cases, cartons, drums, bags. For help in selecting the trucks that best meet *your* food-handling needs, call your YALE representative today. Or mail the coupon below.

YALE* **INDUSTRIAL LIFT TRUCKS AND HOISTS**

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The first PERMANENT

Announcing

THE LQ600 VALVE

ANOTHER LUNKENHEIMER "FIRST"
. . . the revolutionary new bronze valve which has broken all existing performance records in the most severe services in industry!

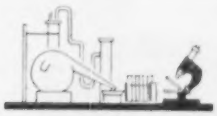
LUNKENHEIMER THANKS THE 100 LEADING COMPANIES WHO COOPERATED IN THE THREE-YEAR LQ600 TESTING PROGRAM

The LQ600 Valve has been tested for three years in carefully chosen "problem installations" in American industry. *Despite the poor records of previous valves, there was not one single reported case of failure or leakage of an LQ600 Valve!* Here are a few typical records:

LUNKEN

THE ONE *Great*

bronze globe valve with a **LIFETIME** *seat and disc!*



The new LQ600 Valve sets an entirely new performance standard — gives you so much more service per dollar that you can't afford to continue using bronze valves that require constant repair and replacement!

Its radical new design and amazing new seating material combine to give you the first *permanent* bronze globe valve. Valve users, cooperating in a three-year testing program, were unable to find *any* service tough enough to wear out an LQ600 — or cause it to leak, even in the most severe throttling services! This new valve is a permanent investment—one that pays cash dividends in maintenance savings year after year!

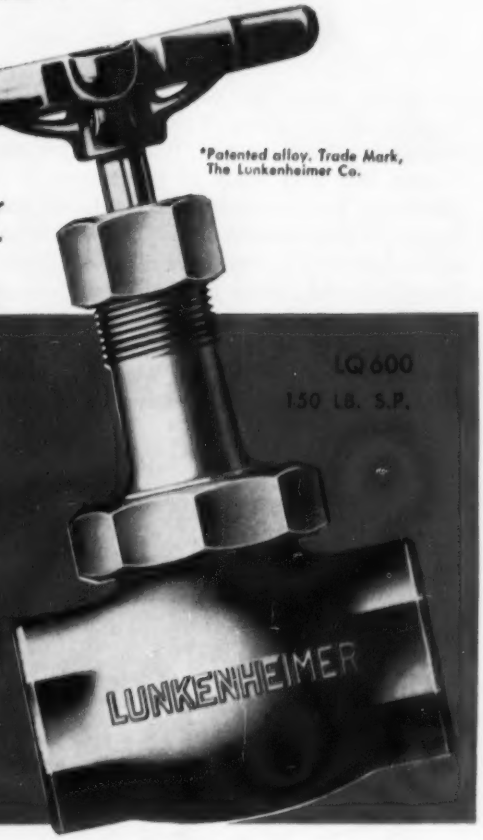
LIFETIME SEATS AND DISCS make these remarkable performance records possible. Seats and discs are made of Brinalloy*, the exclusive new Lunkenheimer alloy that is far more resistant to wear and corrosion than 500 Brinell Stainless Steel — even outwears case-hardened Stainless Steel exceeding 1000 Brinell! There is no need for renewability — Brinalloy Seats and Discs *never wear out.*

OTHER FEATURES include a new, modern flat-seat design (made possible by the exceptional hardness and wear-resistance of Brinalloy) . . . a streamlined new exterior . . . the famous Stemalloy® Stem, which far outlasts any other stem material . . . the cool, easy-to-grip Non-Slip® patented handwheel . . . durable, high-strength bronze in body and bonnet . . . and true back-seating, permitting safe and easy repacking under pressure.

*Patented alloy. Trade Mark, The Lunkenheimer Co.

For more information, call your local Lunkenheimer Distributor or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

TYPE OF SERVICE	LIFE OF OTHER VALVES	USER COMMENT
125 lb. hose steaming	2 wks. to 2 mos.	Toughest service, previous valves leaked.
Water col. blowdown	2 mos.	Plug valves couldn't take it.
185 lb. steam blowdown	1 yr.	Plug valves failed every year.
125 lb. steam blowdown	"Short"	Previous valve leaked every run.
200 lb. steam—water col. blowdown	2 mos.	Previous valves failed by wiredrawing.
Throttling syrup 140°F.	"Short"	Previous valves cut.
150 lb. throttling 380°F.	6 mos.	Plug valves failed regularly.
100 lb. throttling	2 wks. to several mos.	Plug valves couldn't hold up.
130 lb. throttling	8 mos.	Composition seat valves unsatisfactory.
110 lb. throttling steam	3 wks. to 3 mos.	Three other kinds failed.
Scaled hot water line	"Short"	About all makes used—none held up.
125 lb. throttling steam	6 to 12 mos.	Plug valves failed by wiredrawing.
150 lb. steam—scale present	"Short"	Previous valves broke.
150 lb. throttling steam	4 to 5 mos.	Other makes failed by wiredrawing.



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NAME IN VALVES

L-455-4

Sodium Acid Pyrophosphates
Prepared cake mixes, doughnut flours

Monocalcium Phosphates—
Baking powders; pancake, corn meal, and waffle mixes

Calcium and Iron Phosphates
Enriching cereals, baby foods, flour

Tricalcium Phosphate—
Anti-caking agent for salt, powdered sugar, soda

phosphates

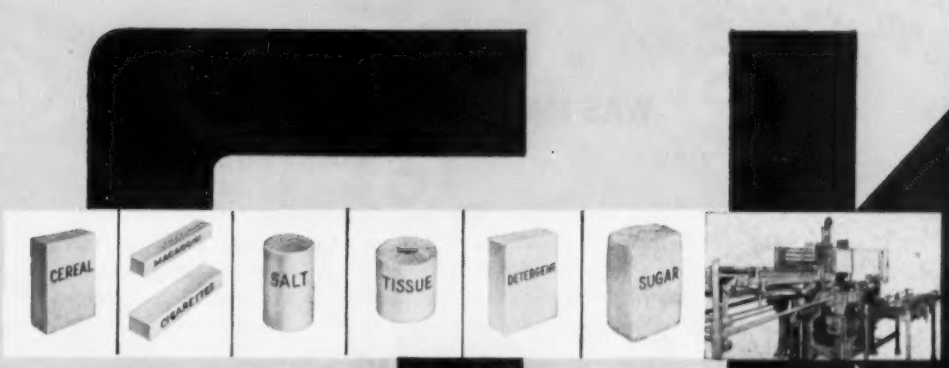
. . . help make better foods

Grandma was a *good* cook . . . with recipe secrets all her own. A pinch of this, a cup of that, and later, warm, sweet fragrances wafted from her kitchen. Back then, it required hours of painstaking care and years of experience to bake a cake. Today, thanks to Victor leavening phosphates, the cake that *didn't rise* is almost non-existent. Brides make perfect cakes . . . puddings in an instant . . . even *five* different kinds of pastries from *one* box of mix. All just as good as "grandma used to make" because today flour millers and food processors depend on Victor for phosphates. They know *it pays* to see Victor. Write Victor Chemical Works . . . 155 N. Wacker Drive, Chicago 6, Illinois . . . In The West: A. R. Maas Division, South Gate, Calif.

VICTOR
Dependable Name in
Chemicals
for 57 Years

For more information, use coupon on last page.

every user of STANDARD-KNAPP 800 PACKERS is saving money



we can help YOU reduce packing costs for cartons, cans, bags or . . .

There are several reasons why Standard-Knapp case packers — and all other S-K equipment, too — **SAVE MONEY**. First, they are engineered by men with unequalled experience in package handling methods. Second, they are built to synchronize precisely with your line requirements. Third, they have behind them a service organization with unparalleled know-how. If you really want to put your package into a case at the lowest possible cost, take it up with Standard-Knapp.

Please write Dept. P for descriptive catalogs.

S-K

STANDARD-KNAPP

DIVISION OF EMHART MFG. CO.

PORTLAND, CONNECTICUT

LATIN AMERICAN REPRESENTATIVES: American Steel Export Company, New York, N. Y.

BACK IN THE 1880's

WHEN MALTED MILK WAS FIRST INTRODUCED

Koven

WAS MAKING INDIVIDUALIZED FOOD EQUIPMENT

Today, various forms of malted milk are enjoyed all over the world—thanks to the efforts of America's food industry pioneers. Yet, even when malted milk was still in the developmental stage—food manufacturers were already speeding up production with KOVEN Individualized Equipment—built to their exact requirements.

KOVEN-built equipment combines know-how accumulated in over 70 years of steel fabricating experience with the most advanced techniques . . . assures cost-cutting efficiency and higher output. Have our representative show you how Individualized Equipment by KOVEN can help your plant set new production records. Call or write today for a consultation—no obligation. Send for Bulletin #550.

Hose Vulcanizer

X-RAY INSPECTION FOR QUALITY CONTROL

KOVEN equipment in all metals and alloys include: High pressure vessels, extractors, mixers, stills, kettles, tanks, stacks, breechings. Shop and field erected storage tanks. High vacuum testing.

PLANTS:

Jersey City, N. J.

Dover, N. J.

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Specialists in:

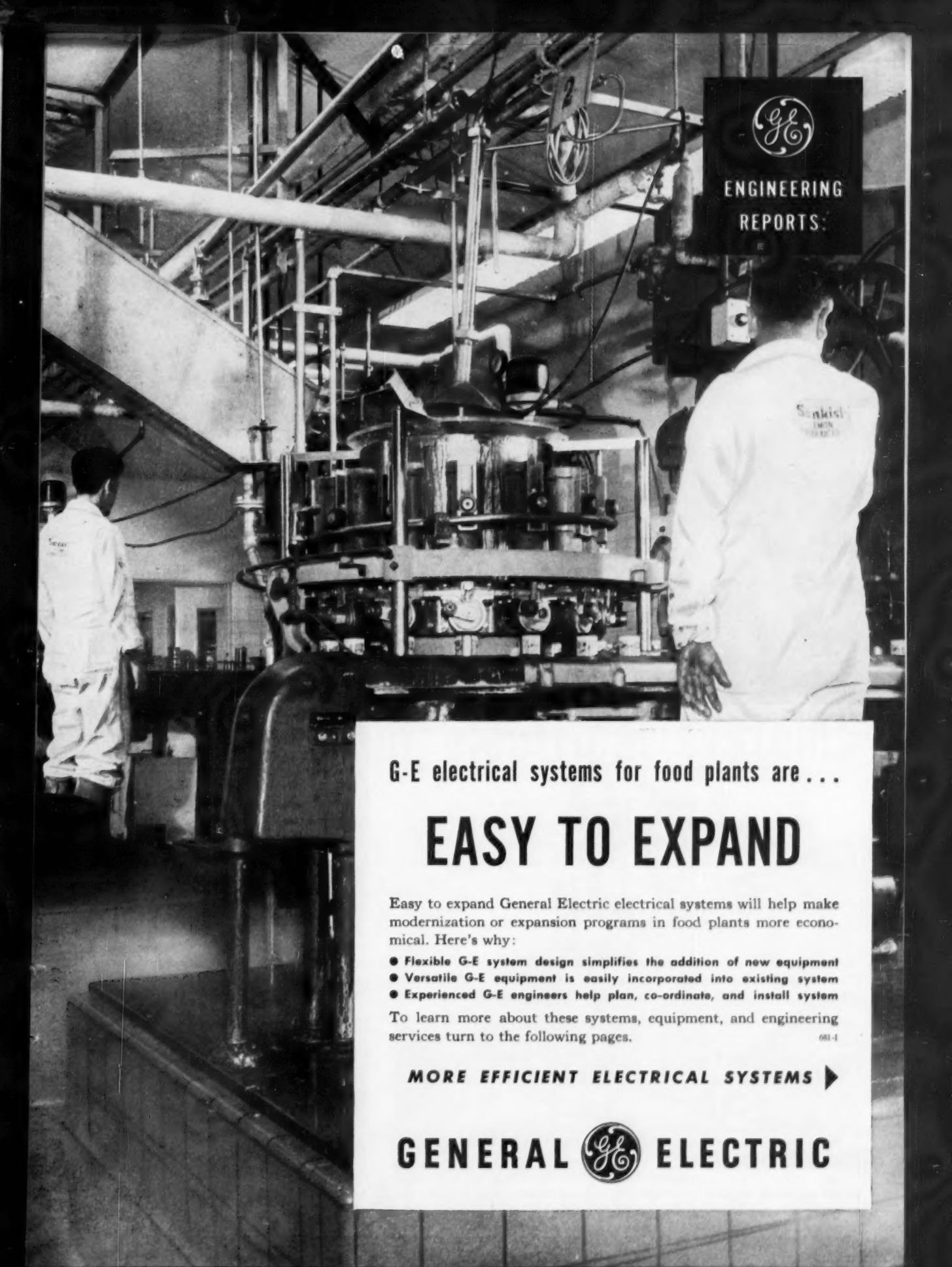
- STAINLESS STEEL
- MONEL
- NICKEL
- ALUMINUM
- INCONEL
- ALL CLAD MATERIALS

Fabrication to all A.S.M.E. Codes

L. O. KOVEN & BRO., INC.
154-D Ogden Ave., Jersey City 7, N. J.

Steam jacketed mixing kettle made of steel.

KOVEN FOR INDIVIDUALIZED EQUIPMENT SINCE 1881



G-E electrical systems for food plants are . . .

EASY TO EXPAND

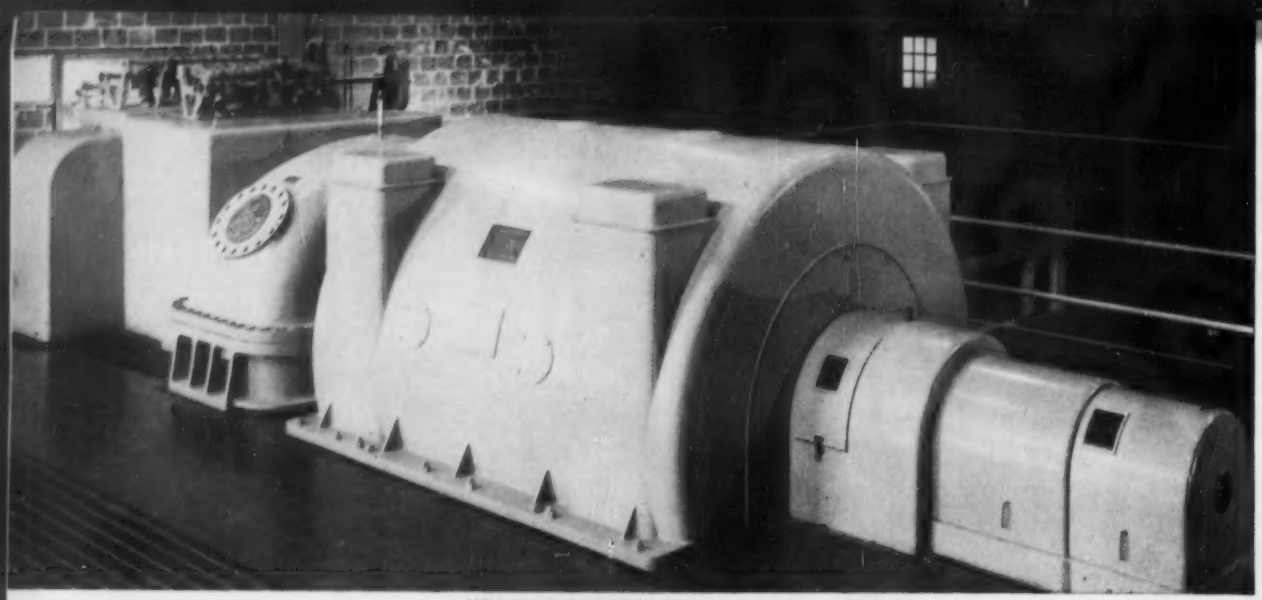
Easy to expand General Electric electrical systems will help make modernization or expansion programs in food plants more economical. Here's why:

- **Flexible G-E system design simplifies the addition of new equipment**
- **Versatile G-E equipment is easily incorporated into existing system**
- **Experienced G-E engineers help plan, co-ordinate, and install system**

To learn more about these systems, equipment, and engineering services turn to the following pages. 661-1

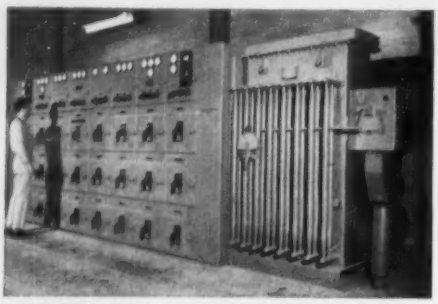
MORE EFFICIENT ELECTRICAL SYSTEMS ▶

GENERAL ELECTRIC



UTILIZING PROCESS STEAM, G.E.'s complete range of steam turbine-generators provide electric power as a by-product, help maintain plant steam balance.

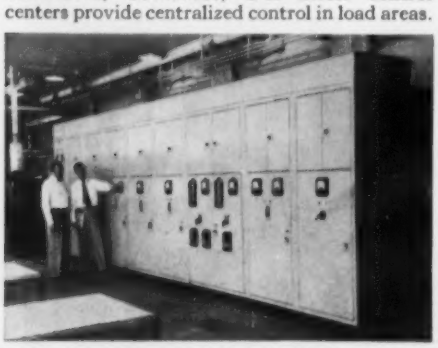
DEPENDABLE G-E gas turbines range from 6700 to 17,000 hp. More than 55 units utilize exhaust heat for power generation and mechanical drive applications.



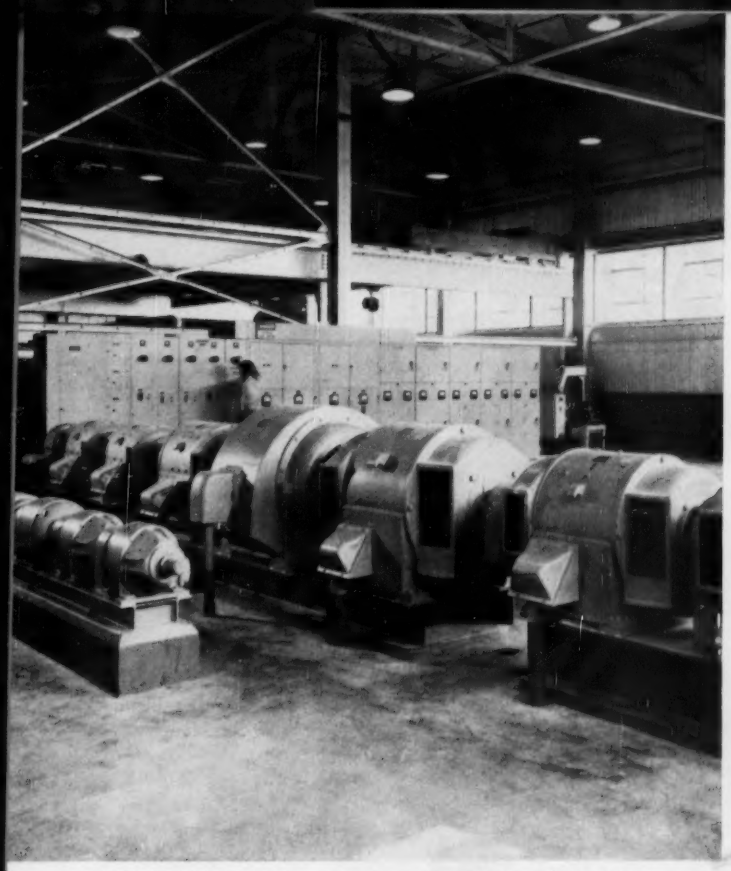
FACTORY ASSEMBLED G-E load center unit substations help cut installation time.

COMPLETE, COMPACT, G-E motor control centers provide centralized control in load areas.

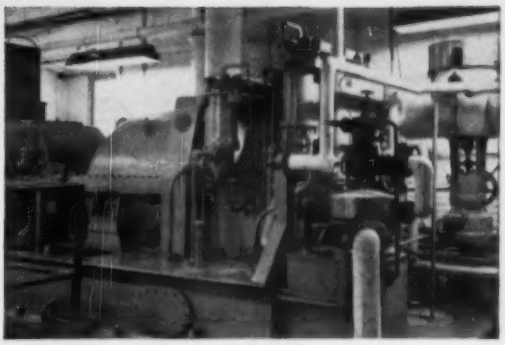
MORE RELIABLE POWER DISTRIBUTION is available with G-E package substations which use co-ordinated transformers, metal-clad switchgear.



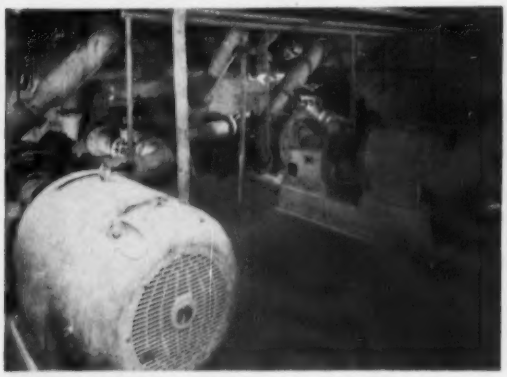
SAVE FLOOR SPACE with compact G-E Limit-amp control units.



DEPENDABLE G-E d-c motor generator sets are designed to operate in continuous service at top efficiency. Minimum of maintenance is a key feature of these sturdy generators built for long life.



ECONOMICAL MAINTENANCE is a key feature in design of G-E mechanical drive turbines.



RUGGED CONSTRUCTION of G-E Tri-Clad* motors make them ideal for all types of drive operations. Polyex insulation in motors 100–3000 hp gives 50% longer motor life. *Reg. Trademark of General Electric Co.

G-E engineering services, equipment can give you . . .

More efficient electrical systems

MODERNIZING, EXPANDING, BUILDING? Whatever your plans, let experienced G-E engineers help plan a more efficient electrical system for you. They will work with you or your engineering contractors to give you correct answers to the following questions.

SHOULD YOU GENERATE OR PURCHASE POWER? G-E engineers will help make a "load" survey of your facilities, and recommend an economical solution to your particular power supply problem.

WHAT TYPE ELECTRICAL DISTRIBUTION SYSTEM SHOULD YOU INSTALL? The latest distribution system concepts will be reviewed with you by G-E engineers. They will help select and design a modern system to meet your individual requirements.

WHAT KIND OF DRIVE EQUIPMENT SHOULD YOU USE? Each application for drives in your processing lines will be individually examined by G-E engineers to assure that the proper drive is designated for the job.

WHERE CAN YOU UTILIZE AUTOMATIC CONTROLS? New developments in the field of automatic controls will be applied throughout your processing lines by G-E engineers.

Let your General Electric Apparatus Sales Representative get you detailed answers to these and other electrical questions. Contact him at your nearest G-E Apparatus Sales Office early in your planning stages. General Electric Company, Schenectady 5, N. Y. 681-3

PROTECT YOUR EQUIPMENT INVESTMENT ▶

Engineered Electrical Systems for Process Industries

GENERAL ELECTRIC

SIX G-E ENGINEERING SERVICES . . .

HELP YOU PROTECT YOUR EQUIPMENT INVESTMENT

1 **G-E APPLICATION ENGINEERING** helps you and your consultants design the right electric system for your plant.

2 **G-E ANALYTICAL ENGINEERING** helps attain the optimum electrical system for your application. Engineering experience backed up by electronic system analyzers save valuable design time.

3 **G-E PRODUCT DEVELOPMENT** laboratories design and test new equipment under tomorrow's conditions to meet your future demands.

4 **G-E FIELD-SERVICE ENGINEERING** helps you supervise installation, expedite start-up of your major electric equipment.

5 **G-E MAINTENANCE SERVICE** from 31 G-E Service Shops will repair and uprate your old equipment, help establish productive maintenance of your equipment, furnish emergency service.

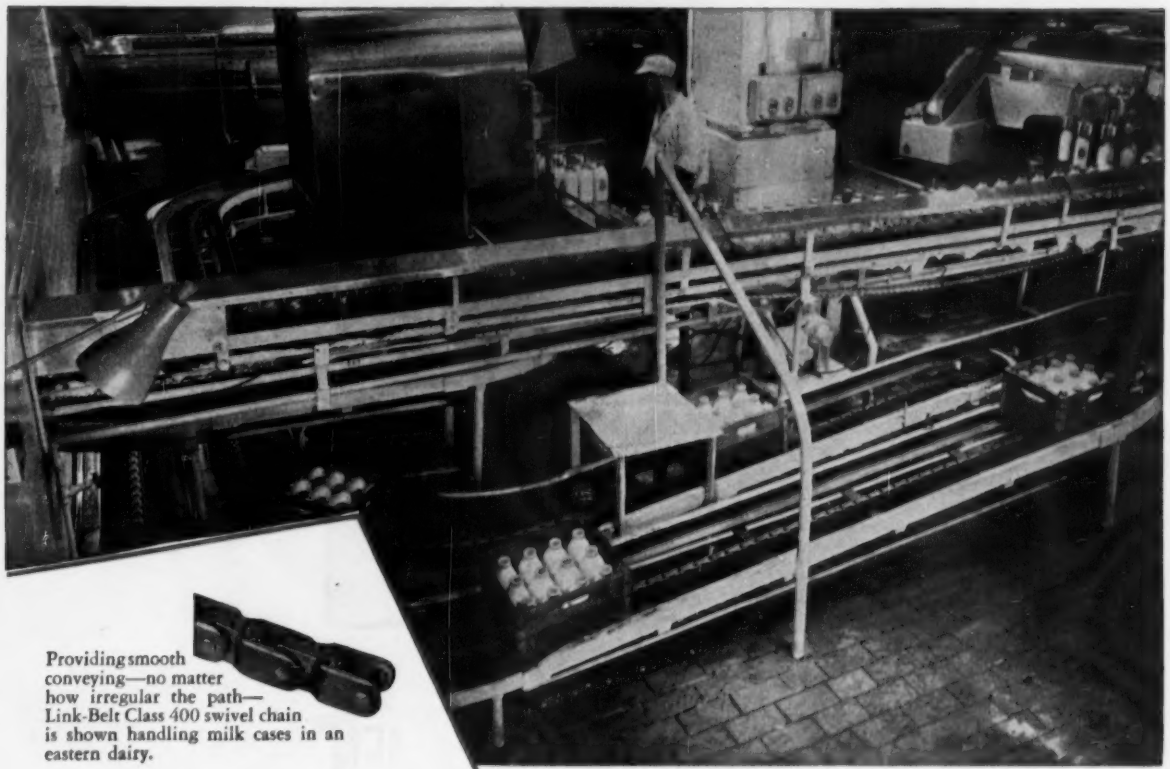
6 **G-E PROJECT CO-ORDINATION** means on-time engineering, shipment, installation of your electric equipment from preliminary diagrams through start-up.

These valuable services are available to you with General Electric equipment. Contact any General Electric Apparatus Sales Office. Meanwhile, for the full story of G-E engineering services, write for brochure GED-2244, General Electric Co., Sect. 681-3, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Around corners . . . over vertical curves--
Link-Belt swivel chain assures smooth travel

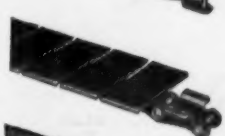


Providing smooth conveying—no matter how irregular the path—Link-Belt Class 400 swivel chain is shown handling milk cases in an eastern dairy.

No ONE chain serves every purpose — choose the right one from the complete line

Class RC universal crescent flat-top chain can be used for multiplane operation traveling variety of paths.

Class RC flat-top chain —precision made for smoothest, spill-free carrying and long life.



S-815 flat-top conveyor chain — economical, sturdy, reliable, easy to detach and to keep clean.

Class RC crescent flat-top chain — travels in horizontal planes, around corners; ideal for bottles and cans.

LINK-BELT offers the chain that's best for every job

HERE'S an economical conveyor chain that's widely used for moving cases, cartons, cans, etc. In addition to its horizontal and vertical flexibility, this Link-Belt swivel chain can be assembled or uncoupled without the aid of tools.

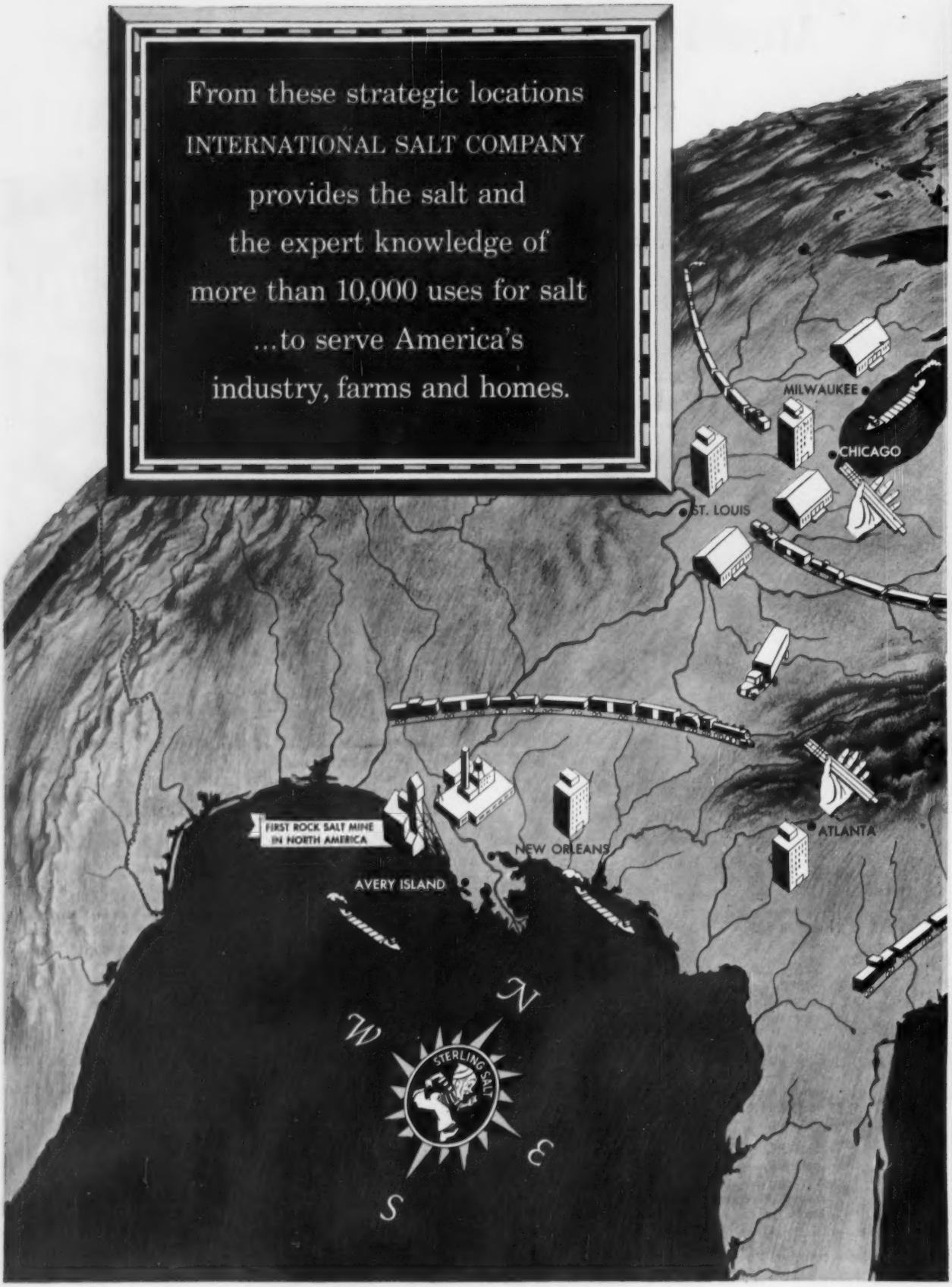
Manufacturing refinements such as these are typical of every chain in the complete Link-Belt line. Accurate control of raw materials and manufacturing processes is your assurance of uniformity, longer life.

For complete information on chains and sprockets for conveying or drive service, see your Link-Belt sales representative. He can show you the *one* chain that's best suited to your exact requirements.

LINK-BELT

CHAINS and SPROCKETS 15.560

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.


From these strategic locations
INTERNATIONAL SALT COMPANY
provides the salt and
the expert knowledge of
more than 10,000 uses for salt
...to serve America's
industry, farms and homes.
MILWAUKEE
CHICAGO
ST. LOUIS
ATLANTA
NEW ORLEANS
FIRST ROCK SALT MINE
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AVERY ISLAND
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E
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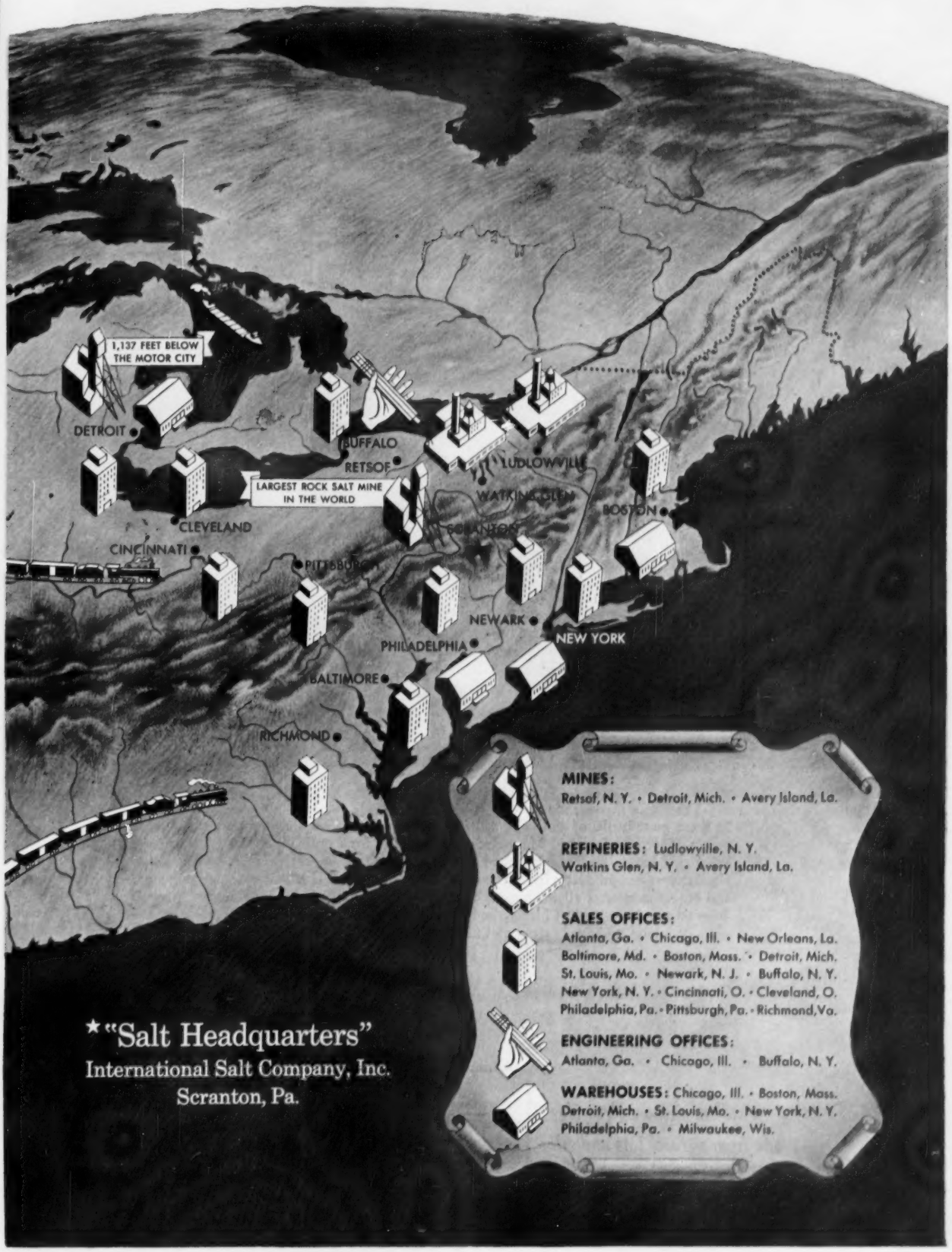
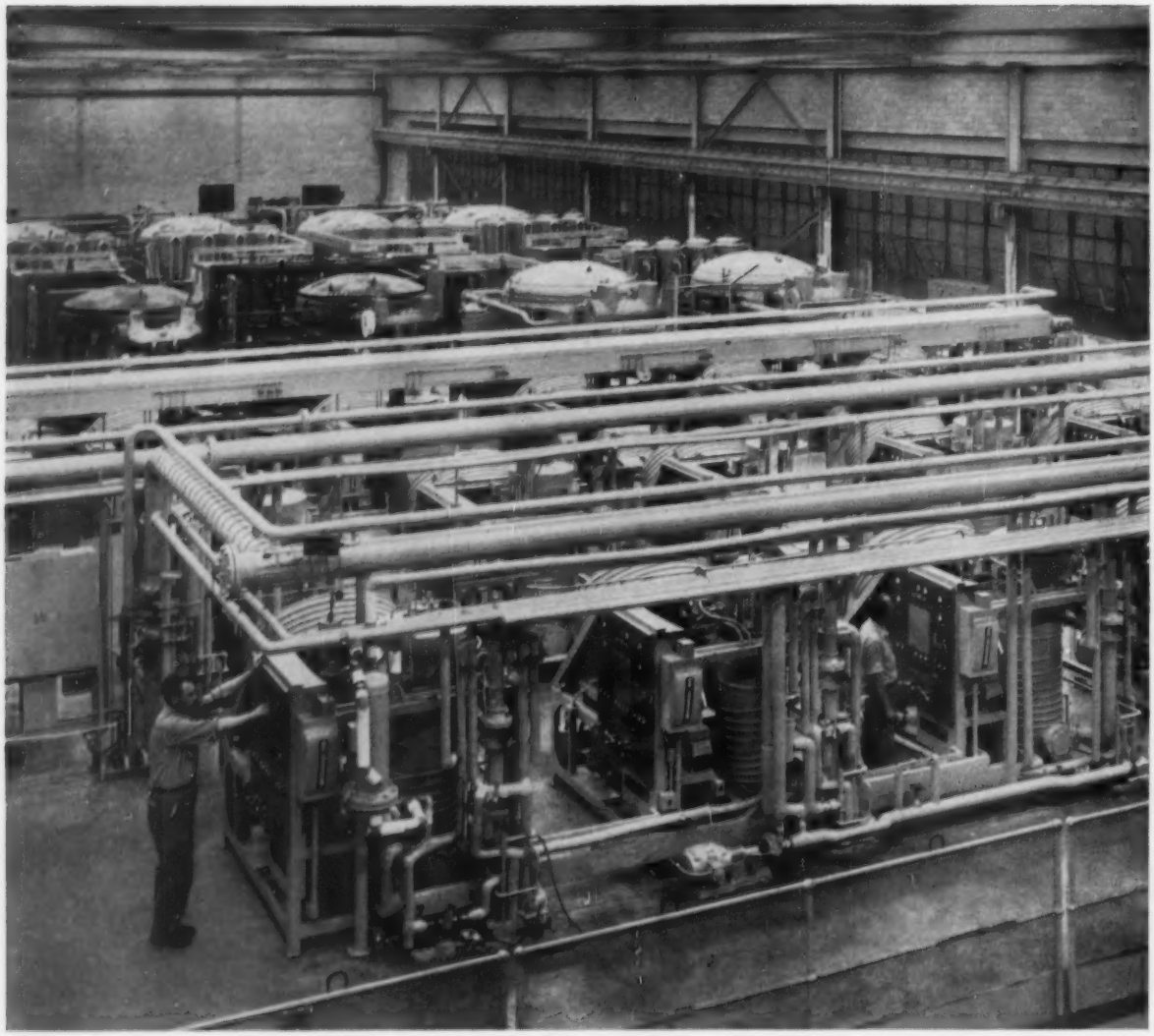
STERLING SALT



For more information, use coupon on last page.



The reason why

In these great banks of molecular stills, DPi performs the extra concentration step that makes Myverol® Distilled Monoglycerides different from ordinary mono-di emulsifiers. What this adds to the cost per pound is much less than what our customers save by emulsifying more end-product with that pound of emulsifier. That is why we keep getting more and bigger customers all the time. ***Distillation Products Industries,*** Rochester 3, N. Y. Sales offices: New York, Chicago, and Memphis • W. M. Gillies and Company, Los Angeles, Portland, and San Francisco • Charles Albert Smith Limited, Montreal and Toronto.

distillers of monoglycerides made from natural fats and oils

DPi

Also . . . vitamin A for foods and pharmaceuticals

Distillation Products Industries *is a division of* **Eastman Kodak Company**

HERE'S PROOF it pays to package in film made of BAKELITE Polyethylene

Packaging made by **Shellmar-Betner Flexible Packaging Division, Continental Can Co.**

"big savings and a powerful impetus to sales"

That's the sum and substance of *all* the advantages found in polyethylene packaging by Northwest Popcorn and Seed Co., Delaware, Ohio. Crediting polyethylene with anticipated zooming sales, John Jeisel, Jr., founder and president, states:

"Not only does polyethylene take printing well . . . but it retains its natural toughness and pliability when stored under varied temperatures. I can truthfully say that we've had absolutely no breakage under normal handling.

"The packages stack easier on shelves, don't slide, and require less space. Polyethylene bags seal quicker . . . cut down production man-hours. Moreover, it is essential that moisture remain stable. With polyethylene, moisture remains the same even for months. Also, the danger of insect infestation is reduced.

"All in all, these features make the storekeeper happy and willing to buy and stock our popcorn in larger quantities . . . increasing sales and saving handling and bookkeeping costs."

Why not see your packaging supplier today and put the same beneficial qualities of film made of BAKELITE Brand Polyethylene to work for you.

SPECIFY FILM MADE OF

BAKELITE
BRAND
Polyethylene Plastic

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.
The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC

For more information, use coupon on last page.

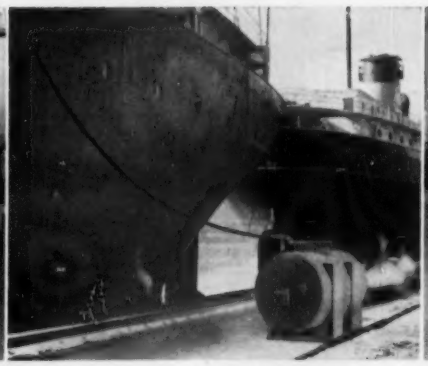
Here's *MASS-HANDLING* of bulk

What you see above is a Dempster-Dumpster serving one of its detachable containers. Multiply this simple pick up, haul and dump operation by scores of steel containers built to meet your requirements for handling waste or salvable materials, raw and finished products, fluids including acids, combustibles, dusty materials, etc. You have, then, mass-handling of bulk materials with one truck and one man!

DEMPSTER BROTHERS

Tilt Type Container is handling filter dirt at a plant in Illinois. Note container is equipped with casters and placed under chute, through which the filter dirt passes directly from presses. As each container is filled, it is replaced with an empty one.

Three heavy duty Drop Bottom Type Containers, shown below, are loaded with cast iron fittings from conveyor at plant in Birmingham. Dempster-Dumpster picks up each container when loaded and hauls the finished products to shipping department.

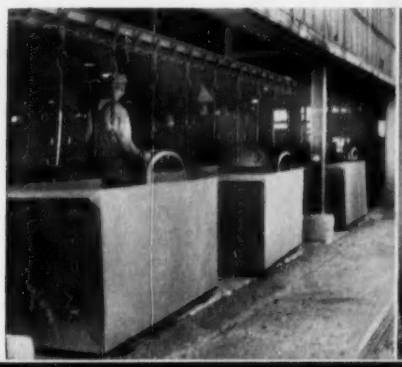


Tank Type Container is being filled with used oil from a ship. Time required to haul loaded container to reclaim station, drain and return for refilling—10 minutes. Time cycle of the former method using conventional barrels—60 minutes.

Here's another example of the many types of waste materials handled by this system. The Skip Type Container shown below is located under hydropulper at a paper plant. Picture was shot while container was being filled with rope waste sludge.

A loaded Apartment Type Container, equipped with roller bearing casters, is being rolled to outside of this plant building. Dempster-Dumpster will pick it up, haul to disposal area, dump the refuse and return empty container for refilling.

Waste materials are loaded into these Universal Containers at a food plant warehouse. Containers have lids in top, as well as a door in each end, which are opened to make deposits, then closed, sealing materials in container.



materials with one truck...one man!

A FEW OF THE HUNDREDS of containers available are shown above in actual service. They are built in capacities up to 21 cu. yds.—several times the capacity of the average dump truck body. One Dempster-Dumpster, operated by only one man, the driver, serves scores of big detachable containers, one after another—handling materials of every description. It's like having one truck with scores of bodies!

Records of performance in dozens of installations prove beyond question that savings are tremendous! The Dempster-Dumpster System cuts costs of equipment and operation. It is common knowledge that one Dempster-Dumpster will perform the work of several conventional trucks, reducing investment accordingly. This system eliminates standing idle time and re-handling of materials. Once placed in these containers, materials remain there until hauled to destination. Efficiency, sanitation and good plantkeeping are big advantages. Materials to be transferred or disposed of are constantly being placed in the containers as they accumulate. Containers for handling refuse are fire-proof, rat-proof and scavenger proof.

With no obligation on your part, our engineers will be glad to make a comprehensive fact-finding survey to determine the cost-cutting possibilities of this equipment in your plant. Write us for complete information today! Manufactured exclusively by Dempster Brothers, Inc.

765 SHEA BLDG., KNOXVILLE 17, TENNESSEE

Sugar Information tells how "SCIENTIFIC NIBBLES" help in weight control

Here the pleasant American custom of enjoying sugar-containing foods and beverages as part of the morning and afternoon "energy break" gets a scientific pat on the back that can help sales of your products.

This good-to-know news reports scientific findings which show the value of sugar in weight control diets. It helps lay to rest the unfounded fears, fostered by artificial sweeteners, that your established, best-selling lines are fattening.

This ad is currently appearing in leading magazines and newspapers throughout the country.

SUGAR INFORMATION, INC.
New York 5, New York

Why do new diets allow for between-meal snacks?

The mid-morning or afternoon energy-refreshing soft drink or nibble can actually be a real aid in reducing

It helps to keep hunger down because it raises your blood sugar level

That makes it easier to keep from overeating at the next mealtime–you are satisfied on single, smaller portions

New scientific studies show why a realistic use of foods and beverages containing sugar can help you diet with less hunger, less fatigue–keeps diets from being boring

Whether you want to slim down or stay slim you'll be glad to know that science has given its OK to foods and beverages that contain sugar.

One of the reasons is that sugar has fewer calories than most people think—only 18 calories to a level teaspoonful. And even a slim young model needs at least 2,000 calories a day to keep the weight she wants.

Another reason, based on latest nutritional research findings, is even more important.

When you include sugar (or foods and beverages that contain sugar) in a well-planned diet, you actually take advantage of the healthy body's system of appetite control.

Part of the foods you eat must be turned into sugar before they can be used as energy. As you *use up* energy the blood sugar level drops. When it falls below a certain point the brain centers which regulate appetite are activated. You get hungry.

As soon as the blood sugar rises above this level, the appetite is turned off. You feel satisfied—even though your stomach may be far from full.

Since it raises your blood sugar level faster than any other food, a little sugar can be a big help in holding down your appetite—and your waistline.

Helps Prevent Overeating

That's why a nibble of something sweet between meals, such as a beverage or a food containing sugar, is often included in the newer reducing diets. It not only helps to keep your appetite within bounds at the next meal... it also helps to keep your vitality up.

On the other hand, *substitution* of artificial non-caloric sweeteners for sugar in foods and beverages can do neither of these things. Since they have no effect on the blood sugar level, use of these substitutes can actually make dieting more *difficult*.

Variety Important

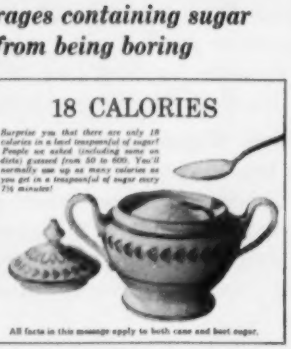
Health authorities now say that a good reducing diet should make as few changes as possible from sound, normal eating habits. One based on *your own* individual food preferences (but with smaller portions all around and no second helpings) is naturally the easiest diet for you to get used to and *stick* to.

And aren't you glad to know that sugar can help you stick to your diet?

SUGAR INFORMATION, INC.
Box 137, New York 5, N. Y.

18 CALORIES

Surprise you that there are only 18 calories in a level teaspoonful of sugar? People we asked (including some on diets) guessed from 50 to 600. You'll normally use up as many calories as you get in a teaspoonful of sugar every 7½ minutes!



All facts in this message apply to both cane and beet sugar.

SINCE 1895

★PNEUMATIC

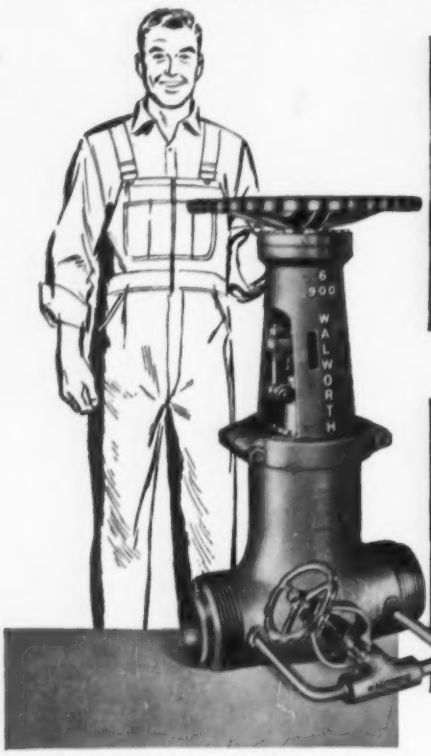
Packaging and Bottling Equipment

COMPLETE LINES OR SINGLE UNITS

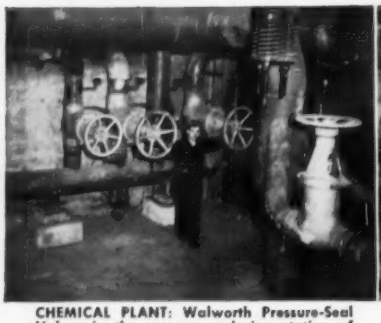
PNEUMATIC SCALE CORP., LTD.,
72 Newport Avenue, Quincy 71, Mass.
Also: New York; Chicago; Dallas;
San Francisco; Los Angeles; Seattle;
Leeds, England. Canadian Division:
Delamere & Williams Co., Ltd., Toronto.

WALWORTH *Pressure-Seal* VALVES

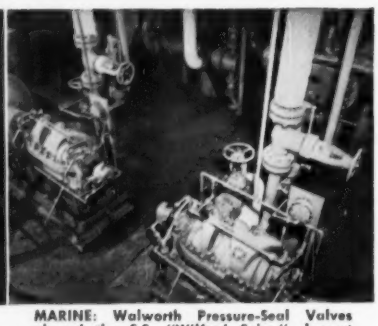
For high-pressure, high-temperature services



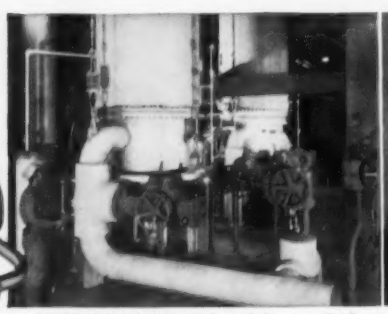
Walworth 6-inch Series 900 Pressure-Seal Gate Valve with Series 1500 Y-type Globe Valve on the by-pass.



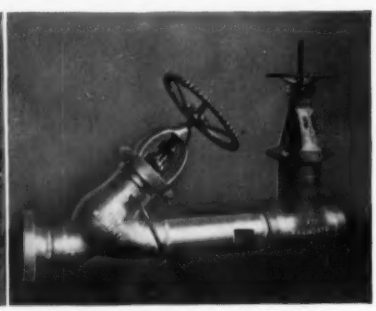
CHEMICAL PLANT: Walworth Pressure-Seal Valves in the pressure reducing station of a chemical plant.



MARINE: Walworth Pressure-Seal Valves aboard the S.S. "Wilfred Sykes"—largest Great Lakes ore carrier.



LIGHT AND POWER: Walworth Pressure-Seal Valves equipped with motor operators, in an eastern public utility plant.



PAPER MILL: Fabricated header with 8-inch Series 600 Pressure-Seal Y-Globe Non-Return Valves and Series 600 Pressure-Seal Gate Valve.

SMALL VALVES FOR HIGH PRESSURE-TEMPERATURE SERVICE

Series 1500 Cast Steel Y-type Globe and Angle Valves in sizes ¼ to 2 inches.

The bonnet and body design of Walworth Pressure-Seal Valves is such that the pressure within the valve is used to prevent leakage at the junction of the bonnet and body. The bonnet joint of the Walworth Pressure-Seal Valve is permanently tight because there is no dependency on the ability of any component part of the joint to resist creep during long exposure to high temperature. Sudden temperature and pressure changes do not affect this tightness. Bonnet flanges and studs are eliminated and the weight of the valve is reduced.

An improved flexible disc design maintains seat tightness, even when the valve body is distorted by pipeline stresses or by temperature and pressure changes. This improved disc design makes it easier to open and close this valve.

Walworth Pressure-Seal Valves are easy to disassemble and assemble, and are the most satisfactory valves for high-pressure, high-temperature service. They are available in Series 600, 900, 1500, 2500 and in a wide range of sizes and types. For further information, write for Circular 116.

WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

LINDSAY RIPE OLIVE COMPANY, LINDSAY, CAL.

Thermoid Conveyor Belting cuts handling costs on food processing jobs

There's a Thermoid Conveyor Belt designed to lower your costs of handling any food product. Here are 3 examples: *CANNERS (WC & PC)*—For handling vegetables, fruit and other foods. Resists acids. Imparts no taste or odor. Available in white or peach color covers. *CANNERS C*—Ideal for use where food is not in direct contact with belt. For packages, waste and refuse. *RUFFTOP*—Thousands of irregular gripper points guide smooth surfaced articles up inclines to 35°.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life, less down time, lower handling costs. Your Thermoid Distributor can help you select the Conveyor Belt best suited for your requirements. If you prefer, write direct for Catalog 3679.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

NEWS from ROCHE

Beta CAROTENE 'Roche'

(an exclusive Roche development)

ADVANTAGES for food processors

NATURAL COLORING

Beta carotene is the natural coloring matter of butter and other dairy products and is a constituent of cereal grains, alfalfa, carrots, and other vegetation. 'Roche' beta carotene imparts a *true* natural yellow color without any tinge of green. It does not change to a reddish color as do some vegetable pigments during storage.

ADDS NUTRITIONAL VALUE

Theoretically, one gram of pure beta carotene is equivalent to 1.67 million U.S.P. units of vitamin A. High retention of beta carotene-vitamin A activity is achieved in baked goods and other foods when margarine and shortening containing added beta carotene 'Roche' are used.

COLOR STABILITY

Extensive laboratory data show excellent color stability of margarine, butter, shortening, cheese, edible oils and yellow bakery products which were colored with beta carotene 'Roche'.

UNIFORMITY

The high degree of purity and color stability ensures uniform and constant intensity of color when using equal amounts per batch.

USAGE

In margarine and shortening. Canned measured amounts of beta carotene with vitamin A in vegetable oil for margarine batch requirements are available to meet specifications of the margarine manufacturer. The contents of the can dissolve readily in the warm margarine oils with uniform distribution throughout the batch.

A semi-solid stable suspension of beta carotene in vegetable oils containing 400,000 U.S.P. units of vitamin A activity per gram dissolves quickly in warm margarine oils or warm fluid shortening when added separately from the vitamin A concentrate. This addition contributes a uniform distribution of color and a substantial amount of vitamin A.

The amount of beta carotene customarily used to color one pound of margarine is generally in the range of 5000 to 6000 U.S.P. units of vitamin A activity. The amount required to color a pound of shortening represents 8000-9000 units.

In butter. Beta carotene may be used to improve the low color and vitamin A level of winter butter. A stable suspension of beta carotene in butter oil containing 500,000 U.S.P. units of vitamin A activity per gram is available for butter processing.

In cheese. Beta carotene has greater advantages than other colors permitted in cheese in that beta carotene is the natural coloring in dairy products and contributes vitamin A.

In bakery and confectionery products. Beta carotene is easily introduced into most bakery and some confectionery products by incorporating the required amount of beta carotene suspension with the margarine, butter or shortening.

Other foods. Detailed information about the application of 'Roche' beta carotene on request.

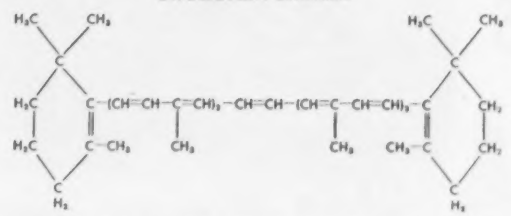
for processors of { Margarine • shortening
butter • cheese
yellow baked goods
edible oils

now in commercial production

TECHNICAL information

Empirical Formula: $C_{40}H_{56}$

Structural Formula:



Crystalline beta carotene 'Roche' is in the all trans form

Color-Vitamin A Relationships

Margarine. The amount of beta carotene required to produce an acceptable color in margarine ranges from 0.0030-36 grams (5000-6000 U.S.P. units of vitamin A activity) per pound.

Shortening. The average amount required to color shortening is 0.0051 grams (8500 U.S.P. units of vitamin A activity) per pound.

Butter. Acceptable butter color, especially in winter butter can usually be obtained by adding 0.0006 to 0.0030 grams beta carotene (1000-5000 U.S.P. units vitamin A activity) per pound.

Molecular Weight: 536.85

Melting Point: 183.0

Appearance: Red-violet platelets

Solubility in Edible Oils:

At room temperature	about 0.08%
At 60°C	about 0.2 %
At 100°C	about 0.8 %

Biological Properties:

0.6 microgram beta carotene: 1.0 U.S.P. units of vitamin A

1.0 gram beta carotene: 1,666,666 + U.S.P. units of vitamin A

PACKAGING

33-pound steel pails, double Synthetasine lined, with removable-replaceable-leverlok cover.

3-pound tripletite tamperpruf metal cans.

Batch size cans of Vitamin A and Beta Carotene 'Roche' blended in vegetable oil to your specifications.

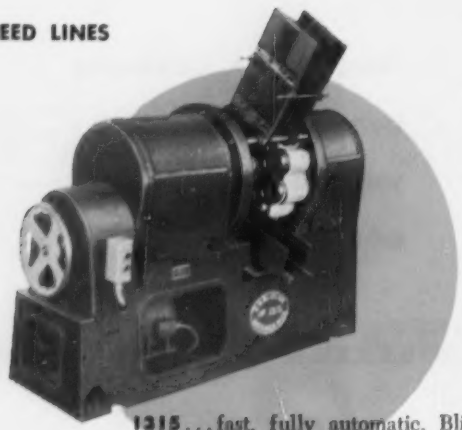
24% Semi-solid Suspension of Beta Carotene 'Roche'
400,000 U.S.P. units per gram
'Roche' beta carotene in vegetable oils.

call ROCHE for vitamins

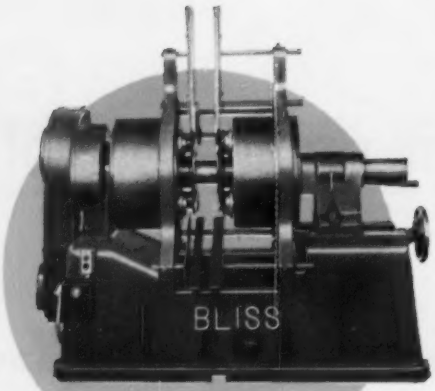
VITAMIN DIVISION • **HOFFMANN-LA ROCHE INC.** • NUTLEY 10, NEW JERSEY
NUtley 2-5000

Pacific Coast distributor: L. H. BUTCHER COMPANY, San Francisco • Los Angeles • Seattle • Portland • Salt Lake City
In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec

FOR HIGH SPEED LINES



1315... fast, fully automatic, Bliss' 8-station, rotary round can double end flanger handles diameters from 2 to 4⅜", heights from 2 to 8".



1416... big brother to the 1315, this double end, 4-station rotary round can flanger handles No. 10 and other sizes.

4 newly-redesigned flangers by BLISS

Here are typical improvements:

On the rectangular flangers... Bliss' exclusive flanging action eliminates danger of body buckle; dies never "squeeze" bodies, never exert damaging end pressure. Extra-long slide gibbing means longer service life.

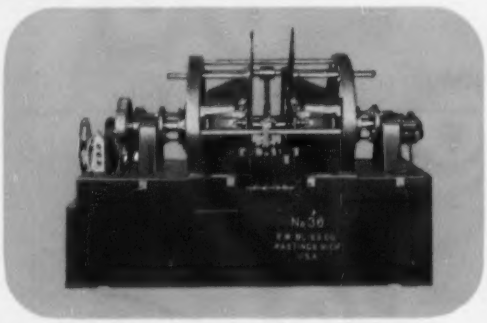
On high-speed round can flangers... Long cylinder slides provide more accurate alignment, last longer. Small diameter turrets work smoother at high speeds.

Rectangular or round, *all* Bliss flangers feature heavy, vibration-dampening frames, modern motor drives and controls. Improvements like these are typical of the news that's coming from Bliss' new plant at Hastings, Michigan. A new scroll shear, new strip feed press—in fact, Bliss' entire line of high speed machinery has been redesigned with an eye to greater accuracy, lower maintenance and longer life.

You'll want to learn more about Bliss automatic and semi-automatic can machinery—the most complete line in the industry: write today for complete information.

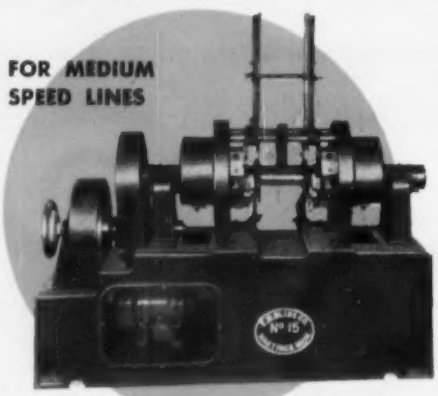
E. W. BLISS COMPANY • *General Sales Office: 50 Church St., N. Y.*

CAN MACHINERY DIVISION: HASTINGS, MICHIGAN



35 & 36... largest of them all, these 4- and 3-station, double end, rotary machines flange square, rectangular, oblong cans up to 8¾" high.

FOR MEDIUM SPEED LINES



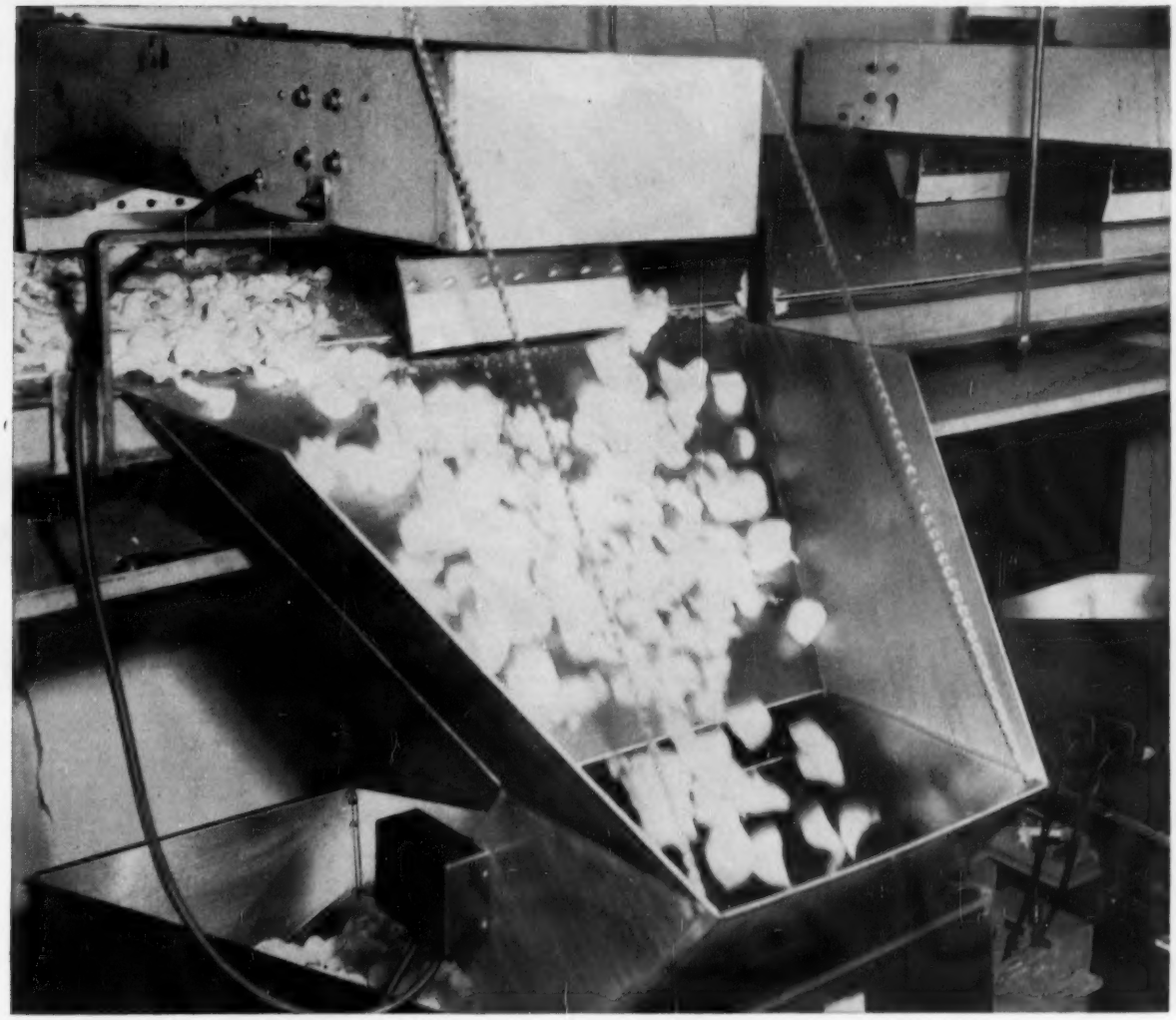
15... Bliss 4-station, rotary flanger for round cans from 2 to 4⅜" in diameter, from 2 to 8" high.

BLISS SINCE 1857 *is more than a name... it's a guarantee*

BLISS CAN AND CONTAINER MAKING MACHINERY

SLITTERS · BODYMAKERS · FLANGERS · SEAMERS · TESTERS · STRIP FEED PRESSES

B. F. Goodrich announces



Koroseal belt unharmed by warm grease and abrasive salt

HERE'S the new Koroseal belt that is making important savings in food processing plants, bakeries and other places like this potato chip plant, where grease and abrasive salt used to shorten the life of canvas, rubber or plastic-coated belts.

Because it's made of Koroseal flexible material, this new B. F. Goodrich belt is not affected by cooking oils, animal fats, most acids—and it stands hard use, rough handling and just about everything else that ruins most materials.

Unlike belts that are just coated with plastic, Koroseal is used throughout this B. F. Goodrich belt, and so resists cracking and peeling, never gets soft or sticky. Oil doesn't soak into Koroseal's tough surface, food particles can't grind in. That's why this belt is so easy to clean. A quick wipe with a damp cloth and detergent, and the Koroseal belt is as clean and new looking as ever.

Other new belts, developed by B. F. Goodrich for food handling, include a thin white Koroseal belt and an oil resisting belt, called Highseal, that's made of a new type of rubber compound. Its "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

Find out more about these longer-lasting, work-saving food handling belts. Have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll have him call you. *The B. F. Goodrich Company, Department M-432, Akron 18, Ohio.*

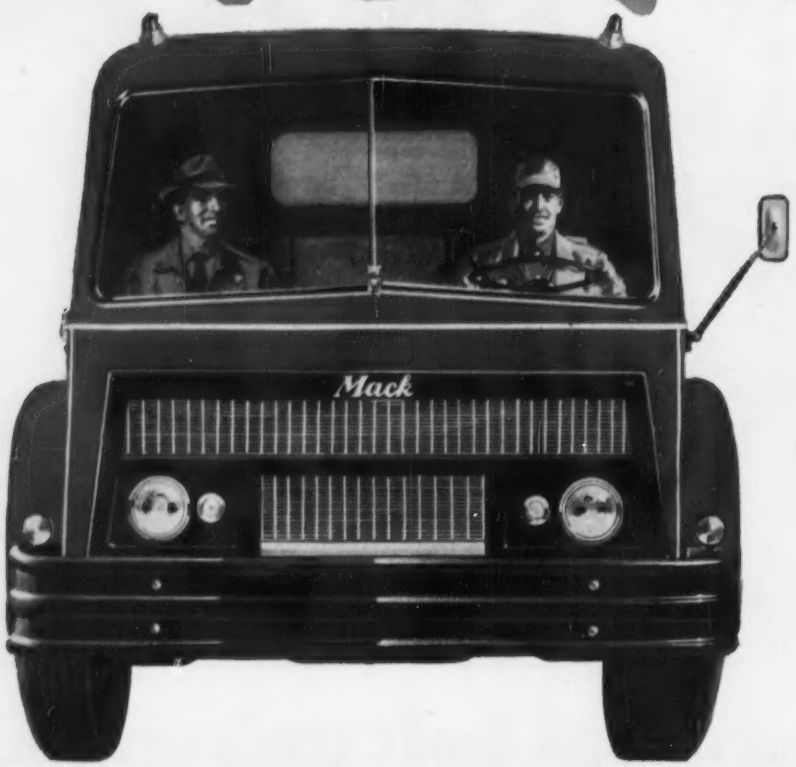
Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

For more information, use coupon on last page.

take a good look-see .

MACK'S



the ultimate in cab-over-engine design

Now—you can get all the benefits that cab-over-engine design has always promised . . . but never before fully achieved! The moment you meet these new Mack D Series cab-forward trucks and tractors, you'll realize how far ahead they are in compactness, maneuverability, and accessibility. That means you benefit from increased load capacity . . . shorter turning radius . . . ease of maintenance which shortens every inspection and servicing operation. And you'll applaud their trim, taut lines, combining modern good looks with money-making practicality.

Moreover, when you take a good, deep-down look, you'll see that they embody the familiar Mack construction, providing strength without structural makeshifts, assuring the same traditional reliability and long economical life that have made Macks the choice for even the most demanding operations, the toughest working conditions.

3095

ONE FULL FOOT SHORTER . . . ONLY

For more information, use coupon on last page.

. . and you'll agree

GOT IT!

MACK'S NEW VERTI-LIFT CAB GIVES YEARS AHEAD DESIGN!

Fast-acting and safe to operate, the D Series Verti-Lift cab is raised ***straight up*** and securely locked ***in seconds*** by means of a hydraulic hand pump or optional electric-hydraulic motor. Full exposure of front of chassis, engine and all accessories is quickly accomplished without disconnections of any kind. No other "cab-overs" give such easy and complete accessibility.

ONLY MACK CAB-FORWARD DESIGN BEST FILLS ALL 10 BASIC "CAB-OVER" REQUIREMENTS

- UTMOST COMPACTNESS
- GREATER MANEUVERABILITY
- MAXIMUM PAYLOADS
- UNEXCELLED VISION
- DRIVER COMFORT
- LOW MAINTENANCE COSTS
- COMPLETE ACCESSIBILITY
- ADAPTABILITY
- RELIABILITY AND ECONOMY
- EASY SERVICING

Strong claims? Not when you get first-hand proof! See the new D Series at your Mack branch or distributor, or write for descriptive literature. Mack Trucks, Empire State Building, New York

Available as straight truck from 20,000 to 28,000 pounds G.V.W. or as tractor in the 40-53,000 pound G.C.W. range.

68" FROM BUMPER TO BACK OF CAB-LIFT

For more information, use coupon on last page.

AUTHENTICATED

CASE HISTORY

From the current files of Hoerner Boxes, Inc.

Re: Miami Products, Inc., Miami, Oklahoma

DAMAGE CLAIMS OF $3500/MONTH ELIMINATED through improved packaging*

Miami Products, Inc., manufactures a line of vertical and horizontal furnaces for sale under nationally known names. During the first five months of operation, Miami shipped their furnaces in wire-bound, open slat wooden crates. Damage claims averaged $3,500 monthly, and the undamaged furnaces arrived dirty and in poor condition.

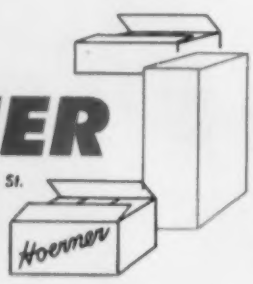
A Hoerner Packaging Engineer was called in. After careful study of the problems, he designed a special corrugated container for Miami Products' furnaces. The package was submitted for Safe Transit Approval and passed the rigid tests with flying colors.

The Hoerner corrugated package has eliminated the damage claims. It delivers Miami Furnaces in perfect condition, and adds the sales appeal of an attractive container displaying the manufacturer's advertising plus the Safe Transit sticker.

** The Hoerner Packaging Engineer Responsible, E. D. Hamilton*

HOW A HOERNER PACKAGING ENGINEER CAN HELP YOU!

If your company packages things, whatever they are, why not ask us to have a Hoerner Packaging Engineer come in and make an objective study of your packaging operations. It won't cost you a cent or obligate you in any way. It can mean an increased margin of profit through savings in labor and material costs and prevention of shipping losses. Just write to one of the Hoerner plants listed below.



SALES OFFICES: *209 S. LaSalle St., Chicago 4*
50 E. 42nd St., New York 17
328 Park Avenue, Urbana, Ohio

HOERNER BOXES, INC.

GENERAL OFFICE: *600 Morgan St. Keokuk, Iowa*

PLANTS—*Keokuk, Des Moines and Ottumwa, Iowa; Sand Springs, Oklahoma; Minneapolis, Minnesota; Fort Worth, Texas; Sioux Falls, South Dakota; Fort Smith and Little Rock, Arkansas; Mexico City, Mexico*

Packaging Engineers Designers and manufacturers of corrugated boxes.

You're sure to be in

GOOD TASTE

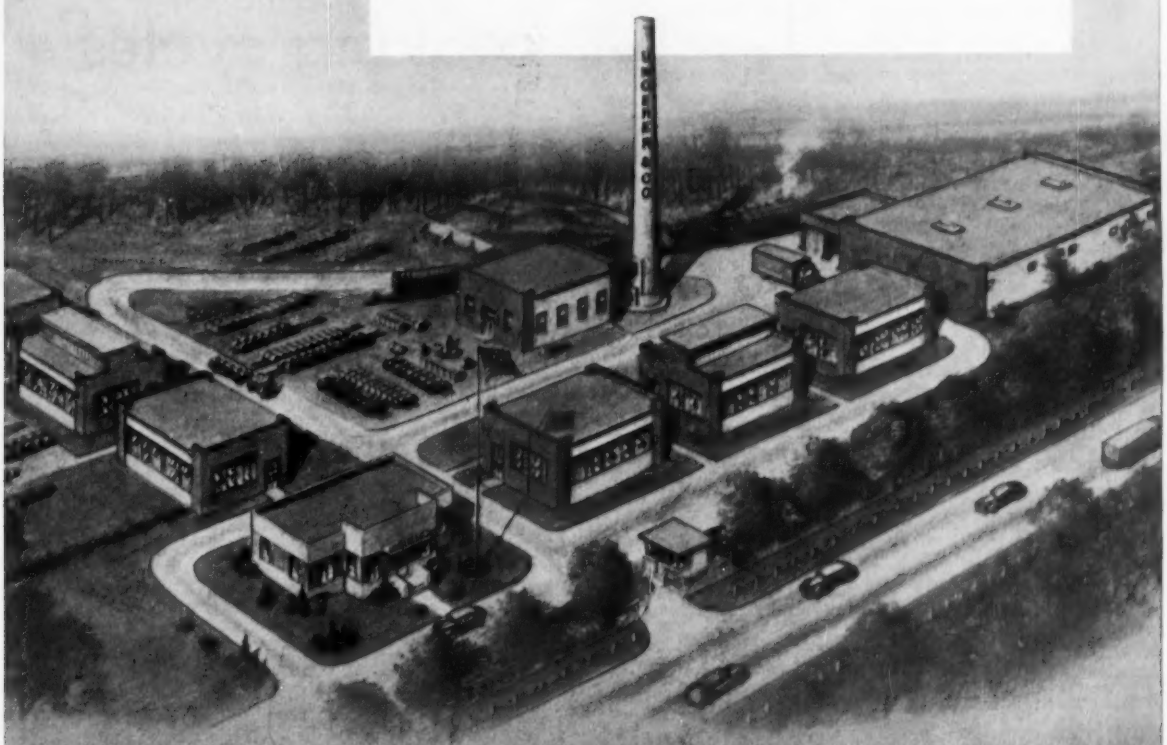
when you specify

UNGERER

IMITATION COCONUT NO. 3023

Another top quality product of the Ungerer laboratories. Samples and technical information on the use of this flavor in your product will be supplied on request.

$16.00 per gallon



Plant and Laboratories, Totowa, New Jersey

UNGERER & CO NEW YORK

Ungerer & Co.

161 Avenue of the Americas, New York 13, N. Y.

CHICAGO • BOSTON • PHILADELPHIA • ST. LOUIS • LOS ANGELES • ATLANTA

For more information, use coupon on last page.

MODERNIZING?

New equipment needs the right instrumentation

When you're planning to install new equipment, plan to take advantage of the full potential of modern methods of measurement and control. It's the sure way to get top value for your modernization investment . . . for the improvements in production economy, quality, and versatility possible with today's production equipment depend increasingly on control instrumentation.

Here are two important points that deserve consideration if you're planning to modernize:

1. Design for control. Instrumentation is more than a necessary appendage. It's a vital, integrated part of the process itself. *Control design goes hand in hand with process design.*

2. Get the right instrument for the job. This seems obvious—but all too often instruments may be stretched or squeezed to fit applications for which they were never intended. *Each instrument should fit its function.*

On point number 1, Honeywell's experienced application engineers will be glad to cooperate with your own staff to recommend ways in which you can obtain the full benefit of modern instrumentation. They have an extensive background not only in contact technology, but also in the processing problems of various industries.

On point number 2, Honeywell offers an exceptionally wide line from which to choose. You're sure to find instrumentation with exactly the right performance . . . at the right cost . . . to fit your process. You eliminate problems of "shopping around" . . . and divided responsibility. This one source can fill practically all your measurement and control requirements.

A talk with your nearby Honeywell sales engineer will give you a detailed picture of what instrumentation can mean in your modernization program. Call him today . . . he's as near as your phone.

Canning and cooking cycles controlled automatically by

For information on the varied line of ***ElectroniK*** *instruments applicable to food processing operations, write for your copy of Catalog 1531,* ***"ElectroniK*** *Controllers."*

Complete cooking control system *consists of new small case pressure controller (left) and Brown thermometer controller (right) with integral timer and signal lights.*

new Brown Control System

ONCE you have determined the best temperature cycle for cooking canned meats to top quality and uniformity . . . how do you duplicate these conditions consistently in production?

For a simple, effective answer to this problem, investigate the two Brown controllers shown here. Readily applied to your own cooking and canning equipment, they take the guesswork out of process control . . . make the whole operation completely automatic and free from human error.

Time-temperature cycles are regulated by a Brown thermometer controller with built-in timer and signal lights. You just set the control index to the temperature you want, and turn the timer dial to the number of minutes desired at temperature. The cycle starts automatically. Under control of the instrument, cooking temperature is raised to the set value, held for the prescribed time, and then the heat supply is turned off. Signal lights tell the operator when temperature is reached and when the cycle is finished. Cycle time can be anywhere from a few minutes to three hours. The instrument's chart gives you a permanent record of the operation.

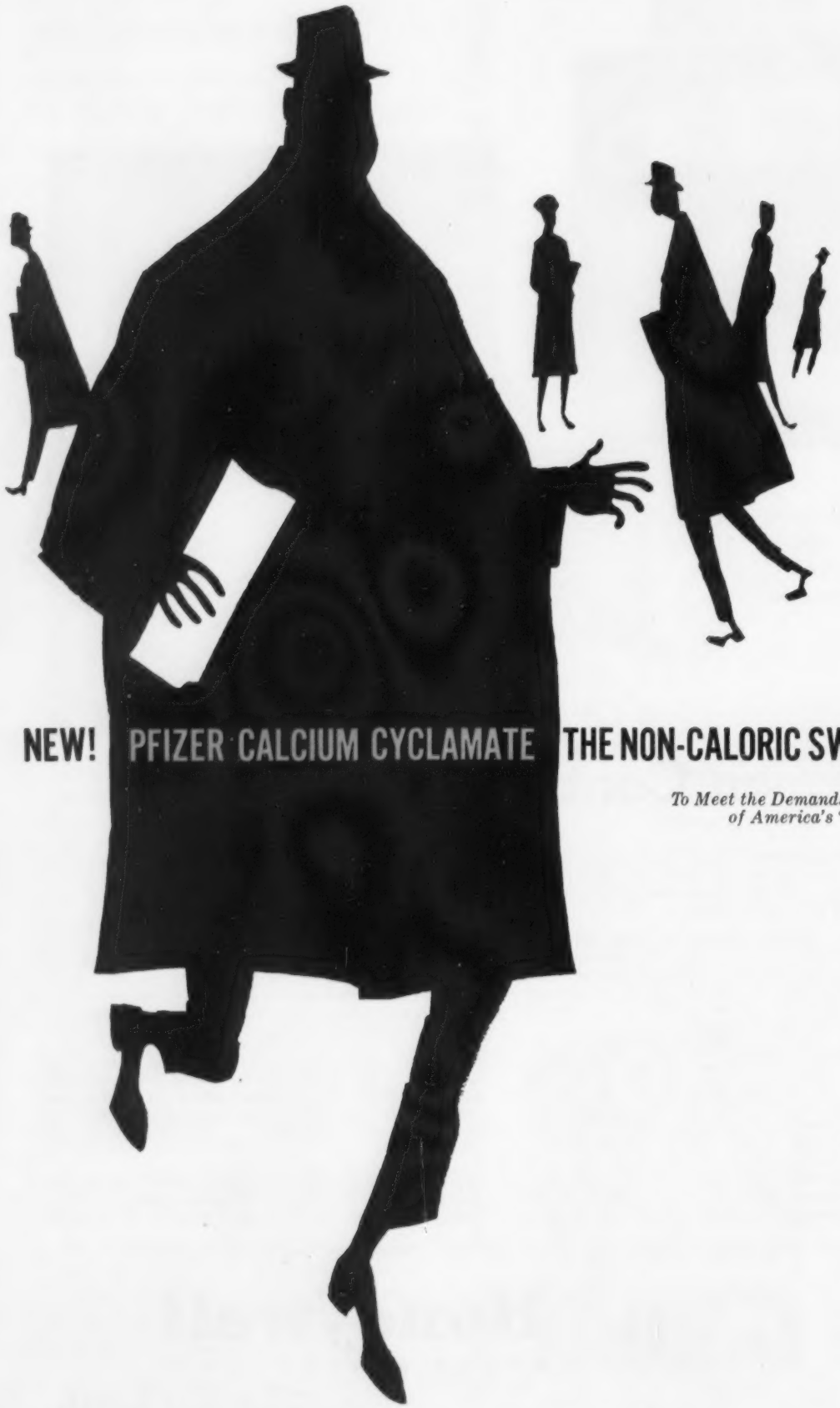
For pressure control, a simple, economical instrument has just been developed for the specific needs of canners. It regulates retort pressure to prevent excessive differential pressures between the inside and outside of the can or glass jar. Especially valuable during blow-down, this instrument gives dependable protection at low cost.

These two new instruments typify the control systems which Honeywell has developed for the diversified needs of the food industry. For a personal discussion of your own plant's requirements, call your local Honeywell sales engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA:** Write for Bulletin 6440, "Thermometer with Timer and Signal Lights"... and Bulletin 7040, "New Small Case Pressure Controller."

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls



NEW! PFIZER CALCIUM CYCLAMATE THE NON-CALORIC SWEETENER

To Meet the Demands of America's "Heavy" Market

Now put Pfizer's knowledge of the food and beverage field to work for you with an ingredient appealing to millions who may be by-passing your brand

New Pfizer Calcium Cyclamate, the non-caloric sweetener, offers a market-appeal so enormous in potential that it encompasses *one fourth of all the adults in the United States!* That's approximately 34,000,000 overweight or diabetic consumers who avoid sugar-sweetened food and drink . . . and *may* be avoiding yours.

This new addition to Pfizer's expanding line of food and beverage ingredients is introduced at a most favorable time. For this *big volume, high profit* dietetic market is now at an all-time high! What an opportunity to "jump in" at exactly the right moment with your own cyclamate-sweetened food or beverage product!

Pfizer Calcium Cyclamate is the ideal sweetener for dietetic and diabetic products. It is highly stable . . . doesn't lose its sweetening effect in cooking, baking, canning or freezing. It is a safe, pure and *sure* sweetener, salt-free to meet strictest diet requirements. It does not impart a bitter off-taste or after-taste, and it's compatible with *all* flavorings.

It will pay you to look into Pfizer Calcium Cyclamate now. Contact Pfizer for full details, a working sample and complete counsel on your plans for launching a full scale or test-market product, aimed at those waiting millions who count their calories!

Manufacturing Chemists for Over 100 Years

Pfizer

CHAS. PFIZER & CO., INC.
Chemical Sales Division
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill., San Francisco, Calif., Vernon, Calif., Atlanta, Ga.

For more information, use coupon on last page.

Daniels wraps measure up . . . in fact you might say that .

Daniels is the yardstick by which quality in wraps is measured

Member of Wisconsin Paper Group for better Pool Car Service

Daniels
MANUFACTURING CO.
RHINELANDER, WISCONSIN

creators · designers
multicolor printers
of flexible packaging

there is a Daniels product to fit your needs

SALES OFFICES: Rhinelander, Wisconsin . . Chicago, Illinois . . Philadelphia, Pennsylvania . . Akron, Ohio . . Denver, Colorado . . Dallas, Texas . . Los Angeles, California

How to lower the cost of elevating your material

PREFERRED FOR LUMPY MATERIALS, or those tending to build up in bottom of the boot.

Boot shafts are furnished with gravity takeups on elevators having 50-foot centers or more.

DESIGNED FOR LIGHT, FREE-FLOWING MATERIALS. Has welded steel, dust-tight casings.

FOR LIGHT, FRIABLE OR SLUGGISH MATERIALS. Buckets mounted on double chain strands.

POPULAR FOR A RANGE OF MATERIALS. Has fixed head shaft, screw type boot shaft takeup.

FOR CRUSHED MATERIALS with lumps less than ½". Fixed boot shaft, adjustable head shaft.

LINK-BELT will recommend the right bucket elevator from these five types

THERE's no surer way to reduce the cost of raising your materials than getting the right elevator for the job. And that's why the broad Link-Belt line of elevators is so vital to you. Our engineers can choose the right elevator designed with regard to your layout and capacity requirements. What's more, the complete Link-Belt line of elevator buckets assures a specific answer to the nature of your material.

There are so many considerations to be met in providing the ultimate in elevating efficiency that it's wise to call in Link-Belt while in the design stages of a new plant. We'll correlate all factors—including proper buckets and spacing for clean pickup and discharge . . . the right takeup . . . correctly designed hood to prevent back-legging. And with Link-Belt, you get design advancements that minimize installation, operating and maintenance costs.

You can reach an experienced materials handling engineer at your nearest Link-Belt office. Call today for full information.

Soybean meal from receiving tank is carried up to roof and delivered to six meal storage rooms by Link-Belt bucket elevator and screw conveyor system.

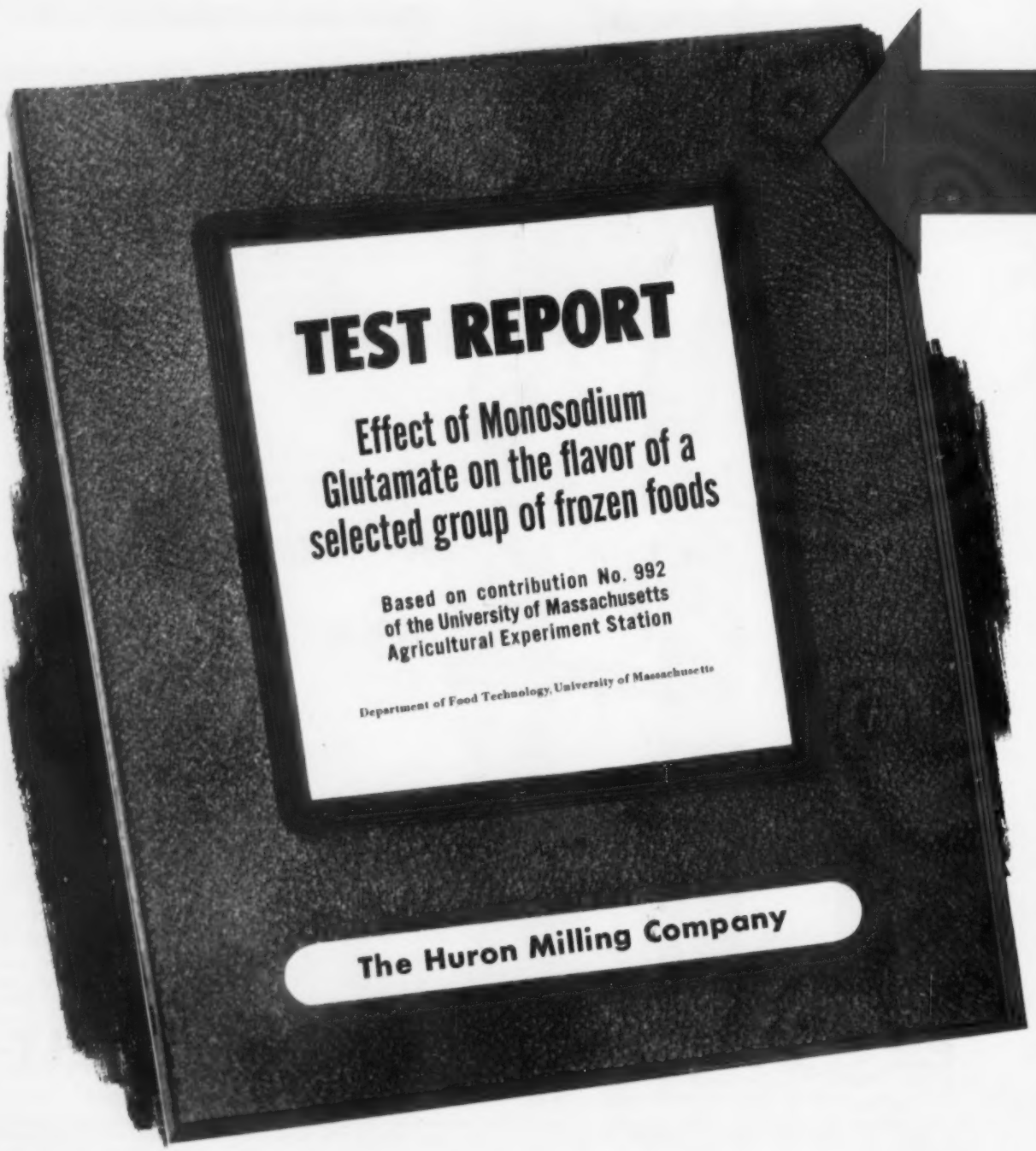
LINK-BELT

BUCKET ELEVATORS 15.705

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

HERE'S PROOF...

Huron MSG makes frozen


TEST REPORT
Effect of Monosodium Glutamate on the flavor of a selected group of frozen foods
Based on contribution No. 992 of the University of Massachusetts Agricultural Experiment Station
Department of Food Technology, University of Massachusetts
The Huron Milling Company

straight from the lab...

food taste better...longer

"...by adding MSG, flavor can be improved ...improvement apparent after year of storage"

DEPARTMENT OF FOOD TECHNOLOGY
University of Massachusetts

Two points—just revealed by new scientific 12-month flavor test reports at the University of Massachusetts make Huron MSG a must for your brand of frozen food!

Two-to-one consumer preference for MSG-treated frozen foods—in over half the taste tests—was definitely established for frozen seafoods and many frozen prepared foods.

After a 12-month storage period, the improvement in flavor of MSG-treated frozen foods was still apparent. Tests also determined most effective use-levels of MSG for each frozen food tested. 8.4.17

Huron MSG's proven ability to keep frozen foods tastier, longer also saves you money

The cost of insuring consumer preference on your brand with Huron MSG—at the use-levels determined by these test reports—runs only ⅛ to less than ½ cent per lb.

But because Huron MSG lets you store your frozen foods up to a year and still maintain improved flavor, you can actually *save* money:

SPOT WAREHOUSING

If fear that your product may lose its flavor has kept you from spot warehousing for a chain, Huron MSG opens up this road to volume sales.

SELL OR HOLD

Huron MSG's ability to maintain "pack-day" flavor lets you sell your products when the market is right—hold them when the price of an item is temporarily depressed by over-supply.

PEAKS AND VALLEYS

Production schedules are often snarled by an over-sized finished pack inventory. Huron MSG lets you greatly increase maximum inventory limits, eliminate costly stop-and-go production.

Write us for reprints of these important test reports today.
The Huron Milling Co., 9 Park Place, New York 7, N. Y.

Huron **MSG**

PURE MONOSODIUM GLUTAMATE 99+%

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INSIDE SCIENCE

The Vital Story of VITAMIN C

by Science Writer

What does vitamin C do for human beings?

Medical research shows that it is essential in maintaining healthy bony tissue and for the formation of collagen which is the main supportive protein of skin, tendon, bone, cartilage and connective tissue. It is needed for vascular function and tissue respiration and in promoting the healing of wounds. In lactating women it has great importance in providing the infant with a sufficient amount of ascorbic acid to prevent scurvy, a disease to which very young babies are susceptible.

Much evidence is available in medical reports to show that a lack of this vital nutritive element can result in impaired health. And in those cases of frank scurvy which still occur, ascorbic acid is the specific medication.

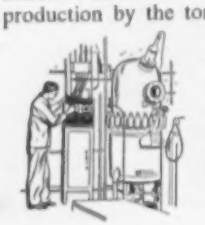
History. The history of vitamin C is fascinating. Scurvy, known for centuries, was once the most prevalent disease in Europe. It afflicted the Crusaders, decimated the crews of voyagers and armies, and plagued the colonists of the New World. In the 18th Century the antiscorbutic value of fresh vegetables and citrus fruits was recognized.

Isolation. It was not until 1918-25 that almost pure ascorbic acid was concentrated from the lemon by Zilva and its important properties and molecular composition established. In 1927 he concluded that this so-called "reducing factor" and the antiscorbutic principle were closely related. In 1928, Szent-Györgyi, who started investigations in 1921, isolated a strong reducing compound from adrenal glands, oranges, and cabbage and termed it "hexuronic acid."

Chemistry. The "reducing factor," "hexuronic acid," and vitamin C were all identified as the same in 1932 by various groups of workers. This was one year after C. G. King, by methods of organic chemistry and experimental physiology, established the chemical identification of vitamin C, thus fulfilling Budd's prediction of 90 years earlier that the antiscorbutic property of certain foods would ultimately be discovered to be a definite substance.

Synthesis. In 1933 Reichstein and his colleagues in Switzerland successfully synthesized ascorbic acid. Almost simultaneously in England Haworth and associates accomplished the same. The Reichstein synthesis formed the basis for large scale commercial production by the world-famous firm of Hoffmann-La Roche.

Production. Following these discoveries came the establishment of manufacturing operations so that today daily production by the tons is the rule. The figures are really staggering. The amount produced weekly in the U. S. A. averages over 15 tons, equivalent to that contained in over 200 million oranges. It is remarkable that ascorbic acid can be produced synthetically and sold for only about $16. per kilogram. One kilo is sufficient to supply 92 people for one year with the minimum daily requirements set by the U. S. Food and Drug Administration.



Vitamin C made by the Roche process is identical chemically and in biological activity with Nature's own product. Because vitamins can be manufactured at a much lower cost than if they were extracted from natural sources they are widely used in dietary supplements and pharmaceuticals. In fact, "New and Non-official Remedies," a publication of the American Medical Association for use by physicians states: "All pure ascorbic acid used in pharmaceutical products is prepared synthetically."

Ascorbic acid is present in many foods. Nature supplies some with lavish amounts and stints on others. In fact, wide variations* have been found in the vitamin C content in varieties of the same fruit.

Deficiencies. Many surveys have shown widespread vitamin C deficiencies in the population. Physicians may call these subclinical, but they are deficiencies nevertheless.

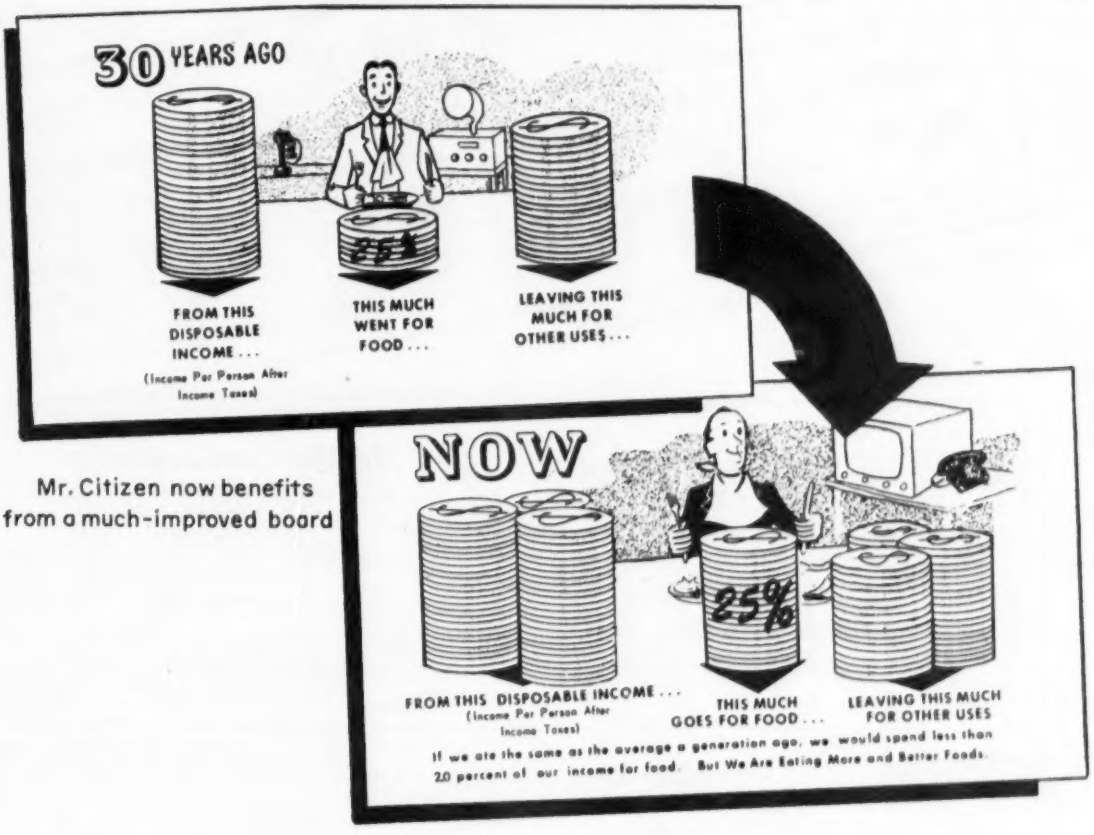
Because of these situations—natural variation and widespread deficiencies—diet experts believe that it is desirable and in the public interest to standardize the vitamin C content of processed fruit and vegetable juices by the addition of enough pure crystalline ascorbic acid to make them consistently dependable sources of this necessary food element. Some of these juices are: tomato, grape, orange, grapefruit, pineapple and apple.

Requirements. The U. S. Food & Drug Administration has set 30 milligrams as the adult minimum daily requirement of ascorbic acid. This daily intake is just about sufficient to prevent recognizable signs of vitamin C deficiencies although a subclinical or an unrecognized deficiency may exist. In view of this, the National Research Council has established 75 milligrams as the recommended daily male adult allowance and 70 mg. daily for female adults, which levels are supported by many controlled nutrition studies. However, the N. R. C. recommends 90 mg. daily for boys between 13 and 15, 100 mg. daily for boys between 16 and 20, and 150 mg. daily for lactating women.

This article is published in the interests of pharmaceutical manufacturers and food processors who make their good products better with essential, health-giving vitamin C. Reprints are freely available. Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

*The table shows minimum and maximum levels of ascorbic acid in commercially canned juices. All figures are in milligrams per 100 grams of juice. Data from U. S. Department of Agriculture.

	Min.	*Max.*
Apple juice	0.2	3.6
Grape juice	0.0	4.7
Grapefruit juice	10.0	49.0
Orange juice	9.7	70.0
Pineapple juice	5.4	18.0
Tomato Juice	2.5	32.0


30 YEARS AGO
FROM THIS DISPOSABLE INCOME . . .
(Income Per Person After Income Taxes)
25¢
THIS MUCH WENT FOR FOOD . . .
LEAVING THIS MUCH FOR OTHER USES . . .
NOW
25%
FROM THIS DISPOSABLE INCOME . . .
(Income Per Person After Income Taxes)
THIS MUCH GOES FOR FOOD . . .
LEAVING THIS MUCH FOR OTHER USES
If we ate the same as the average a generation ago, we would spend less than 20 percent of our income for food. But We Are Eating More and Better Foods.

Mr. Citizen now benefits from a much-improved board

MORE AND *BETTER* FOODS

■ Striking progress over three decades is bannered in bright new USDA booklet that specially reflects wide achievements of industry . . . Here are 9 of its pointed pictographs of today's sweeping advances over yesterday

HERB POWELL
Managing Editor, "Food Engineering"

We invite harassed food operators to forget for a moment their present problems and take in this glowing perspective of the industry's great strides—see the nine panels in the accompanying pages.

This rewarding vista of the significant distance food has come since 1925 is from *More and Better Foods*—a new Department of Agriculture booklet full of fast-fact sketches and charts.

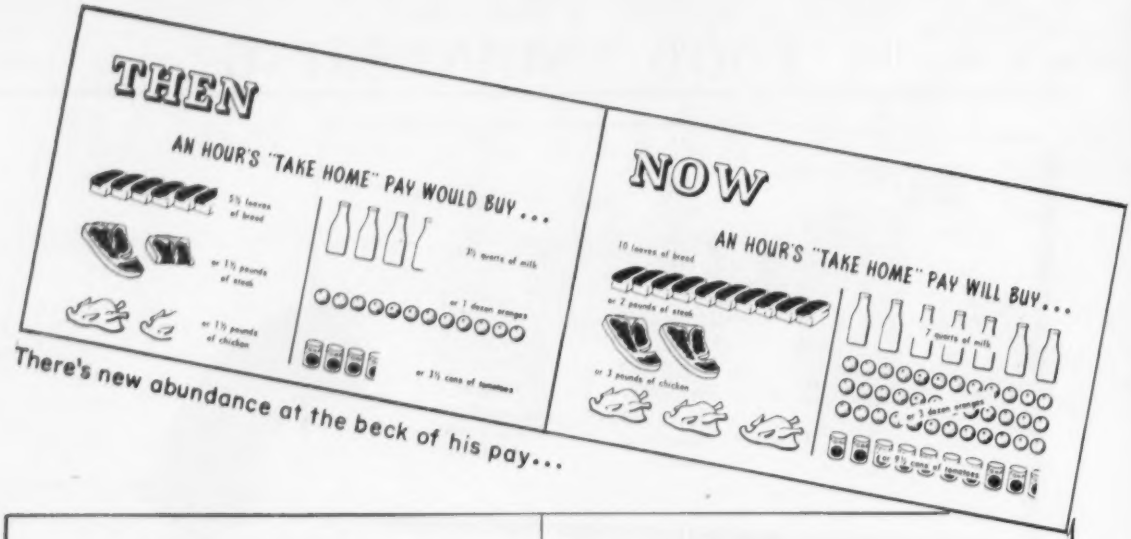
Because it tells the story of advances in quickly grasped terms, it's a topnotch "selling piece." And the enterprising food operator may well take a leaf from it—pass on its finger-tip facts where they'll do the most good, both in-plant and out-of-plant. Use it as a tool.

In a succinct foreword, Secretary of Agriculture Benson particularly hails the contributions of food manufacturers and distributors as well as farmers, in making better living possible "by using science and invention to increase efficiency and improve their service to consumers."

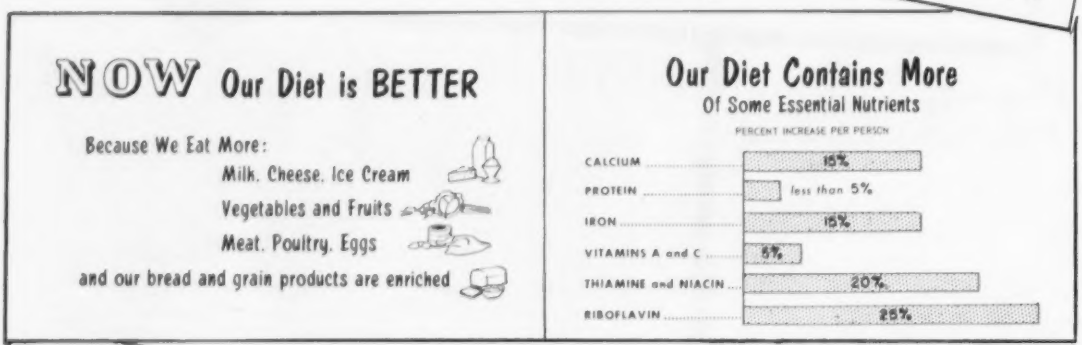
Then two score pages of pictographs speed along through all the high points concerned with the 30 yr. of progress.

You can get copies of this colorful booklet (15¢ each) by writing to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Just ask for Agriculture Information Bulletin No. 138.

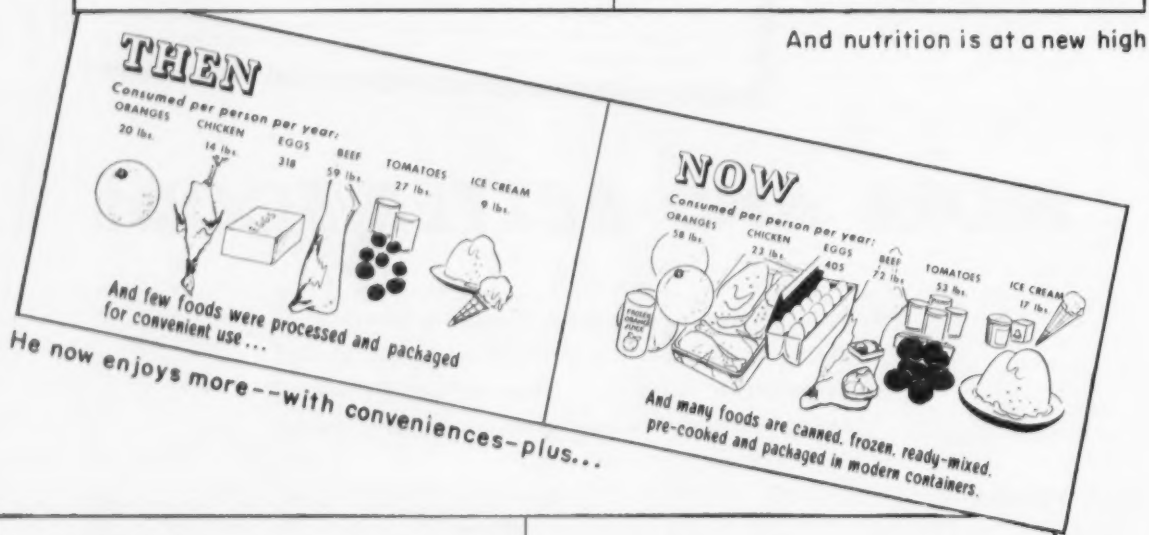
8 Other Revealing Panels Follow ➡


THEN
AN HOUR'S "TAKE HOME" PAY WOULD BUY...
5½ loaves of bread
or 1½ pounds of steak
or 1½ pounds of chicken
3½ quarts of milk
or 1 dozen oranges
or 3½ cans of tomatoes
NOW
AN HOUR'S "TAKE HOME" PAY WILL BUY...
10 loaves of bread
or 2 pounds of steak
or 3 pounds of chicken
7 quarts of milk
2 dozen oranges
2 cans of tomatoes

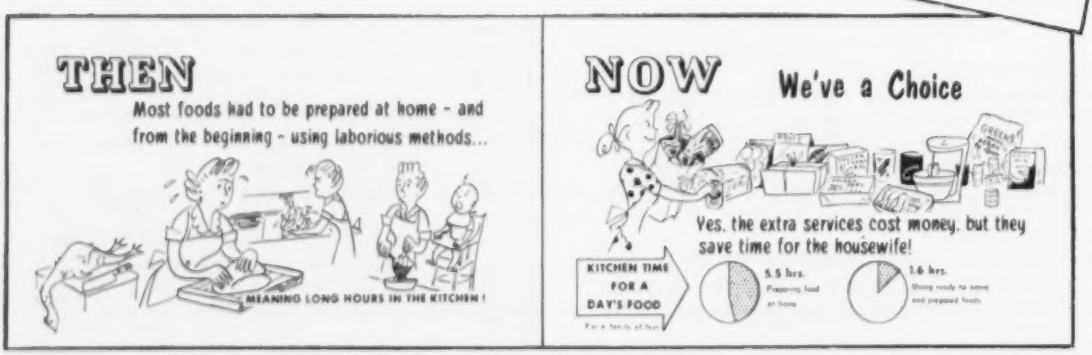
There's new abundance at the beck of his pay...



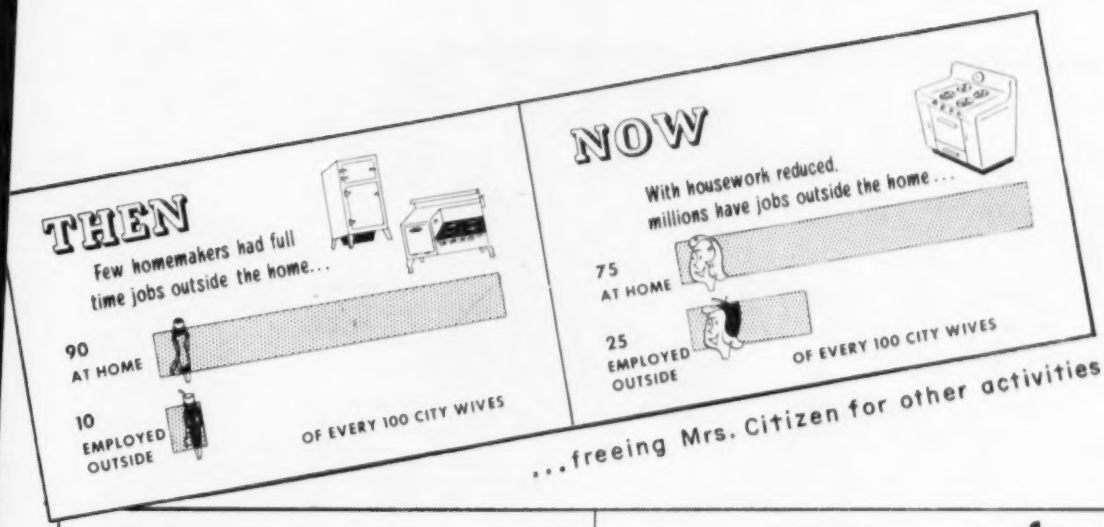
And nutrition is at a new high



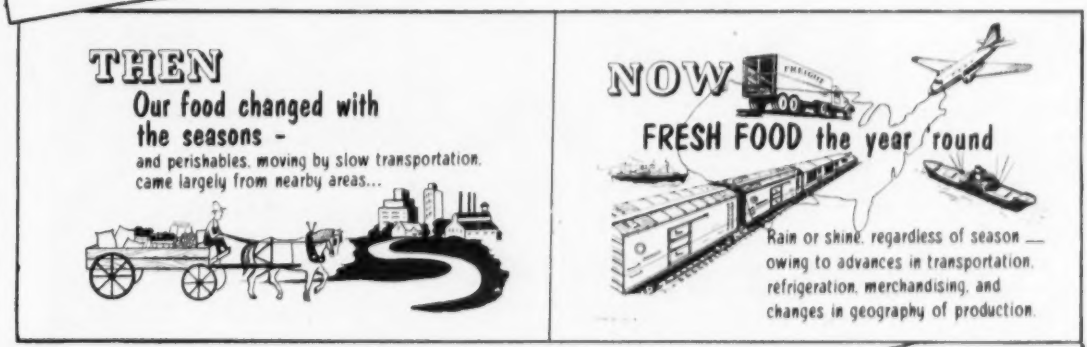
He now enjoys more--with conveniences-plus...


THEN
Most foods had to be prepared at home - and from the beginning - using laborious methods...
MEANING LONG HOURS IN THE KITCHEN!
NOW
We've a Choice
Yes. the extra services cost money. but they save time for the housewife!
KITCHEN TIME FOR A DAY'S FOOD
5.5 hrs.
Preparing food at home
1.6 hrs.
Using ready to serve and prepared foods

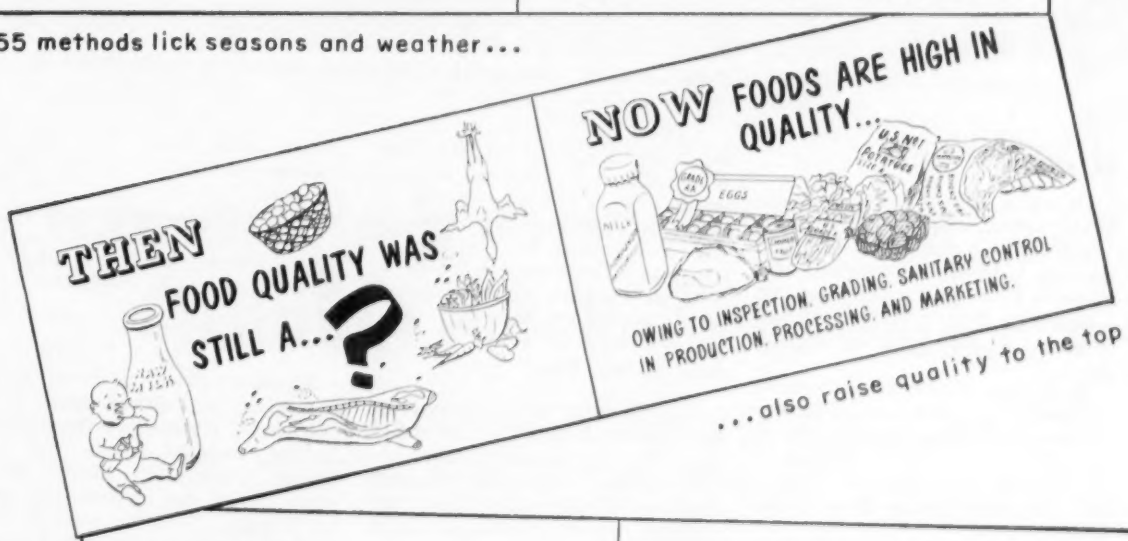
...that save work and cut time 70%...



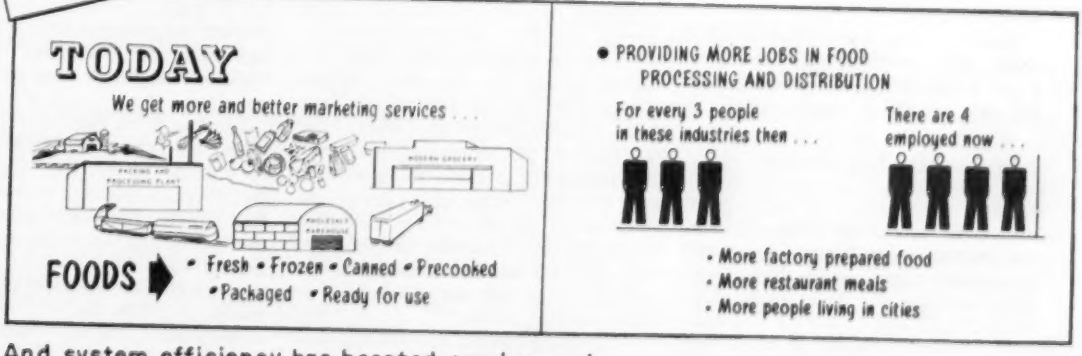
...freeing Mrs. Citizen for other activities


THEN
Our food changed with the seasons -
and perishables, moving by slow transportation, came largely from nearby areas...
NOW
FRESH FOOD the year 'round
Rain or shine, regardless of season — owing to advances in transportation, refrigeration, merchandising, and changes in geography of production.

'55 methods lick seasons and weather...

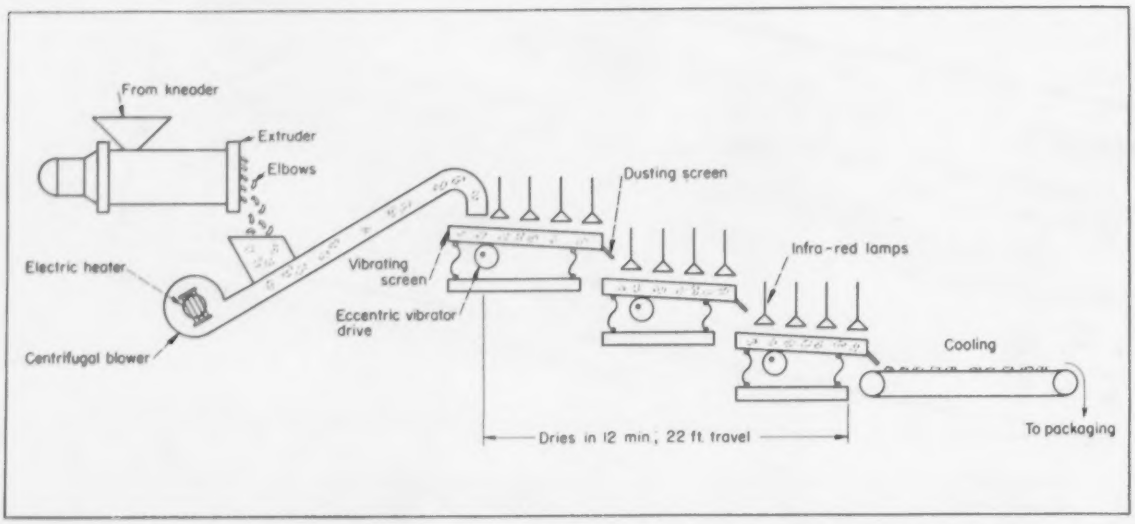

THEN
FOOD QUALITY WAS STILL A...?
NOW FOODS ARE HIGH IN QUALITY...
OWING TO INSPECTION, GRADING, SANITARY CONTROL IN PRODUCTION, PROCESSING, AND MARKETING.

...also raise quality to the top


TODAY
We get more and better marketing services...
FOODS
• Fresh • Frozen • Canned • Precooked
• Packaged • Ready for use
• PROVIDING MORE JOBS IN FOOD PROCESSING AND DISTRIBUTION
For every 3 people in these industries then...
There are 4 employed now...
• More factory prepared food
• More restaurant meals
• More people living in cities

And system efficiency has boosted employment

New Process Takes Out Moisture—Toasts Product



IN 12 MINUTES this streamlined operation removes moisture from macaroni product and toasts it. Extruded elbows are blown by 140-F. air to series of cascading shaker screens which pass them under infra-red lamps.

Quick-Dries With Infra-Red

Cuts about 18 hrs. off process time. Simultaneously toasts new low-calorie macaroni for unique color and taste. Non-stop operation saves on equipment

FE STAFF

Drying is an expensive, time-consuming operation in macaroni factories. With short-cut macaroni products, it takes up to 18 hr. What's more, considerable floor space is taken up and a large amount of conveyor equipment is needed to carry the goods through dryers.

In a typical plant, for example, macaroni may make as much as nine passes on wire-mesh conveyors through an approximate 24-ft. preliminary dryer. It would then have to make five and seven passes through two finishing dryers.

Needed, too, are forced-air fans, steam coils, steam traps, pumps, exhaust ducts, and temperature record ing and controlling instruments.

New Product—New Process

Now, in a search for a high-protein, low-calorie product, a Midwest macaroni manufacturer has come out with a sweeping change in his drying operation—slashing the time from about 18 hr. to 12 min.

New product, made up with high-protein wheat and soya flour, is different in appearance and taste from conventional short-cut macaroni. Infra-red drying gives it a brown, toasted appearance. With its high protein content, this product was developed to serve as a main-course dish, instead of being an accessory, like potatoes and rice, to a meat or fish dish.

Dried in "No Time"

The macaroni is machine-extruded at a 1,000-lb./hr. rate. A rotary cut-off forms the elbow-shaped macaroni into 1-in. lengths. Next, the macaroni drops into a hopper that feeds it into a simple, company-developed forced-hot-air conveyor (about 12 ft. long).

An 18-in. centrifugal fan, with electrical heaters in fan-inlet section, forces 140-F. air at a 1,000-cfm. rate over the goods to prevent them from sticking in the air-moving operation. Drying, at this point, is not significant.

Then the macaroni is gently deposited on the first of the cascading series of three vibrating screens, moving out of a curved discharge on the air conveying tube without need of an air-separating device.

Cascading screens are 4x8 ft., with flat, stainless steel bottoms. They are canted about 5 deg. Vibrating is achieved mechanically through eccentric cams. Screens occupy 24 ft. of space, with 6 ft. headroom.

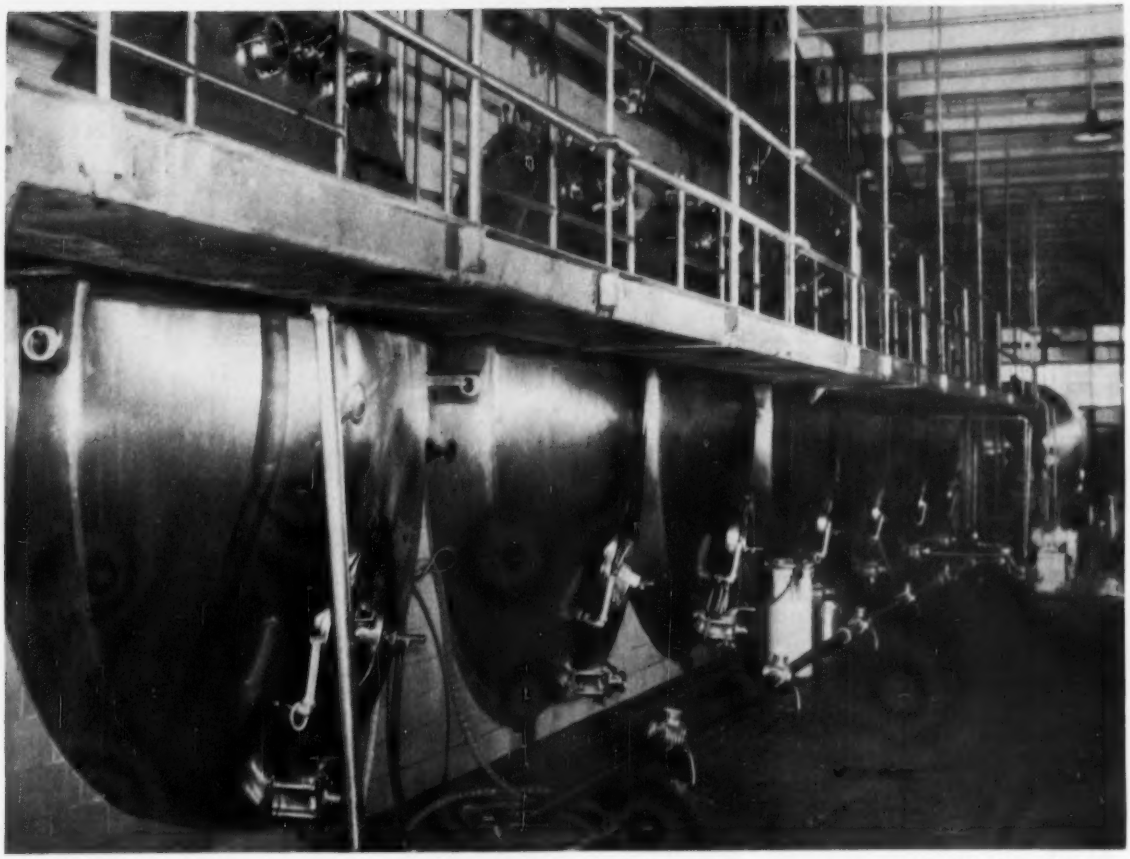
Directly above each screen is a battery of infra-red lamps that toast-dry the macaroni to 230F. in 12 min.

Stop-and-Go Vibration

Significant about the drying operation is the intermittent, rather than continuous, vibrating of the screens. As the macaroni travels over the screens, it alternately vibrates for a ½-min. period and remains stationary for 1 min. Vibrating tumbles the product for uniform drying and toasting, while the 1-min. rest period allows the macaroni to soak up the infra-red heat.

Moving from one screen onto another, the macaroni is gently vibrated to separate fines. This separation is by 10-mesh sloping, dusting screens that advance the macaroni, with minimum breakage, onto the next cascading screen.

From the last screen, the toast-dried macaroni drops onto a slow-moving cooling belt (25 ft. long) that carries it directly to the carton-filling machines.



EIGHTY FOOT LONG lines near wall (top) through which raw milk is delivered to storage tanks, and 3-in. discharge line (near floor) form part of CIP system now operating at "Leagues" Manhattan plant.

How *Benefits* Outweigh the *Problems* in

Cleaning Pipelines In Place

Taking the challenge, DL dairy goes ahead with big CIP installation and wins better sanitation, lowers bacteria counts, and saves on labor

ARTHUR V. GEMMILL
Senior Associate Editor, "Food Engineering"

Like many other dairy plant operators, Dairymen's League Co-Operative Assn., has found that cleaning pipelines in place has a number of advantages over the "take-down" method.

Looming large among the benefits of this system are—

- ▶ **1. Reduction in cleanup labor.**
- ▶ **2. Savings in cleaning materials.**
- ▶ **3. Lower bacteria counts.**
- ▶ **4. Less wear and tear on pipelines and fittings.**

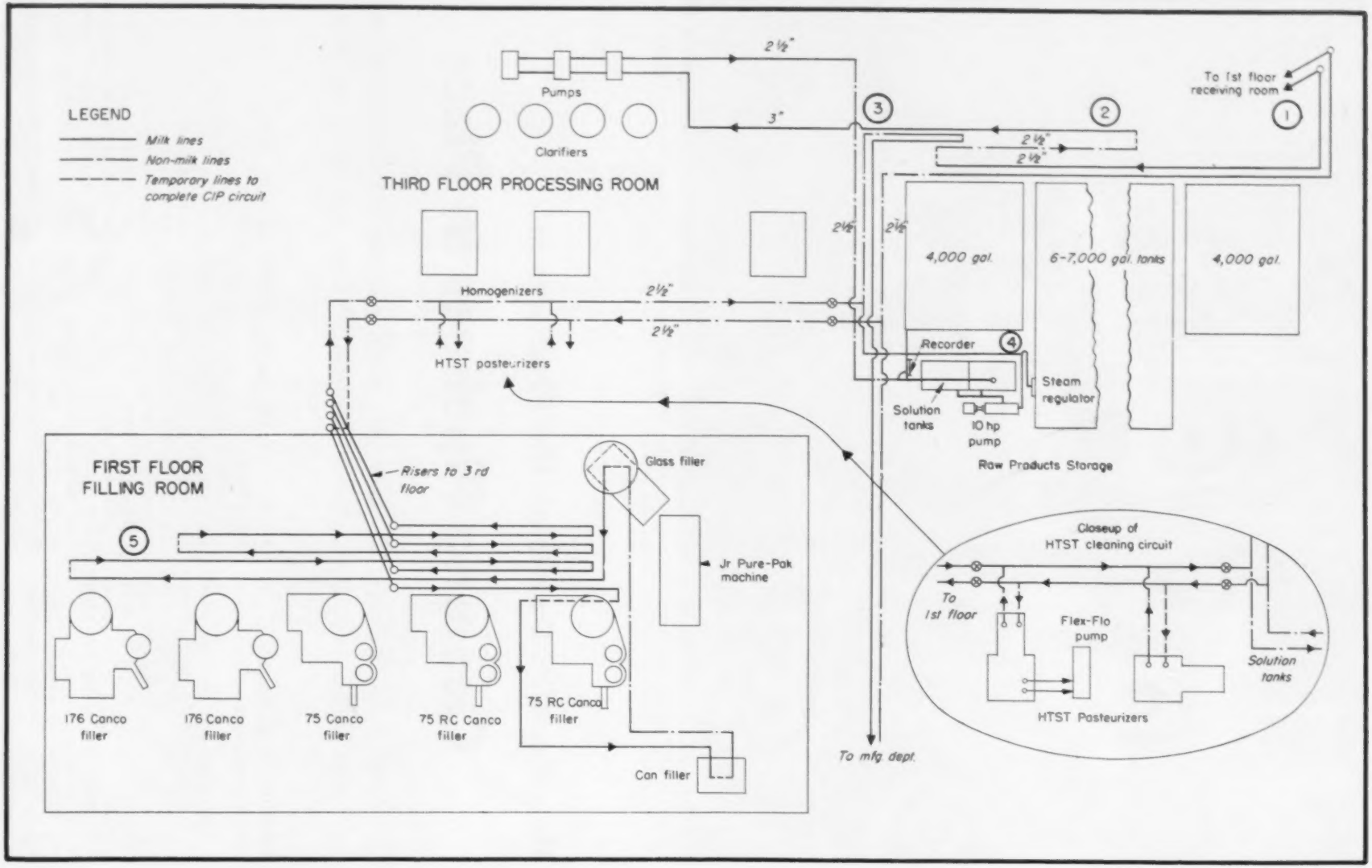
But the company also found that each plant presented specific problems which had to be solved before the CIP system operated satisfactorily, and gave results that were comparable with "take-down" installations.

This was pointedly illustrated at "The Leagues" modern New York City processing and bottling plant located at 12th Ave. and 48th St., Manhattan, where raw and pasteurized product lines approximating 800 ft. are now cleaned in one continuous circuit.*

This 3-story plant has a capacity exceeding 300,000 qt. daily. It receives milk and light cream by tank trucks from collecting stations in New York State. Upon arrival at the plant, tankers are backed onto scales in the street-level receiving rooms and their contents pumped to raw storage tanks on the 3rd floor.

* System is operating on a trial basis pending approval by the New York City Health Department.

Schematic of 800-Ft. CIP System Showing Auxiliary Lines, Solution Tanks, Pump



When the plant was built in 1946, one 2½ in. stainless line was provided for transfer of these raw products. Later, however, it became necessary to install a second 2½ in. line to speed unloading. Incidentally, this additional line also enabled transfer of a second product simultaneously.

Lines rise vertically (40 ft.) from pumps in the receiving room to near the ceiling of the 3rd floor. Then they run across in front of the 8 large horizontal storage tanks with connections to each. Length of each horizontal run is approximately 80 ft. (see lead photo).

Pasteurizing and processing are carried out on the 3rd floor. Then products flow—through four parallel lines—to fillers on the first floor.

Due to local health department regulations which do not provide for CIP, the installation had to be made in separate steps, with careful testing between each step.

First to be cleaned in place, therefore, was the glass line used to convey raw products from storage tanks to the byproducts, or manufacturing department. This line was suspended from the 3rd floor ceiling and was particularly difficult to disassemble and take down.

Using available stainless piping, and fittings that were converted to take plastic gaskets, a second line was suspended directly below the glass line. A small portable tank for solution, and a 2 hp. pump completed the setup. By connecting end of glass line with stainless line in the manufacturing room, and hooking pump to glass line in raw storage area circulating cleaning was possible.

Results of this operation convinced management and Health Department officials of its feasibility.

• Shortly thereafter, need for the previously mentioned second line from receiving room to raw storage tanks became evident. So it was decided to construct this line with new CIP fittings and install similar fittings in the other line. Wherever feasible, Tee's in both lines were replaced with 90 deg. bends to eliminate dead ends.

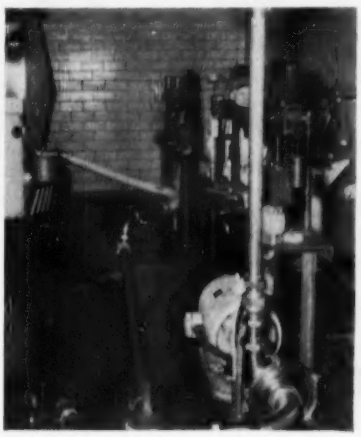
With these lines in place it was possible, by use of a short connecting section in the receiving room, to pump cleaning solutions down one and up the other. When this was practiced, however, an unforseen problem developed.

General practice has been to fasten horizontal lines rigidly in hangers to prevent vibration due to pumping products through them. This method was applied to the two 80-ft. runs of piping in front of raw storage tanks on the 3rd floor. They were tightly clamped to ceiling-mounted hangers.

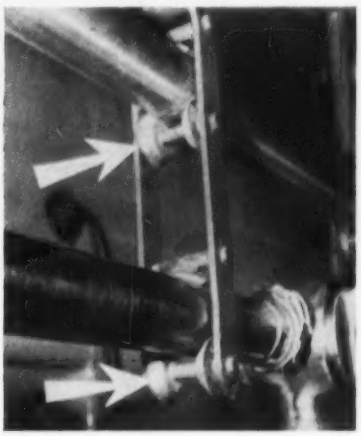
But when hot cleaning solution was pumped through these lines, and followed by 180 F. water to sterilize them, their lengths increased. Then, when cold milk was pumped through them, the lines shrunk. Effect of this daily expansion and contraction was

(Turn to page 115)

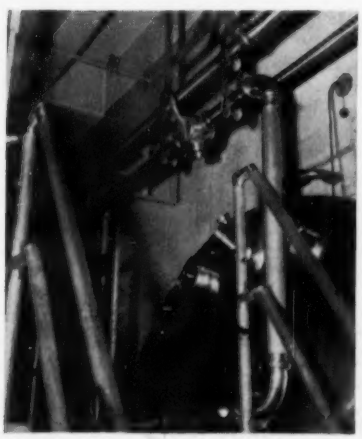
CLOSEUP PHOTOS ⟶
KEY TO POINTS ON
⟵ DRAWING



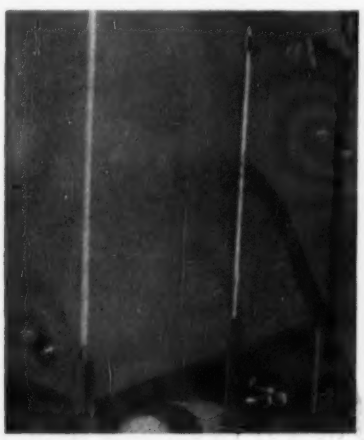
1 STREET level receiving room has three tanker weighing-unloading stations. Products are pumped to 3rd floor storage tanks.



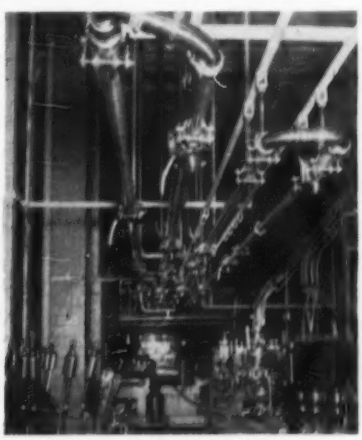
2 ROLLERS in bottoms of hangers (arrows) allow the horizontal lines to expand and contract, yet hold them rigid.



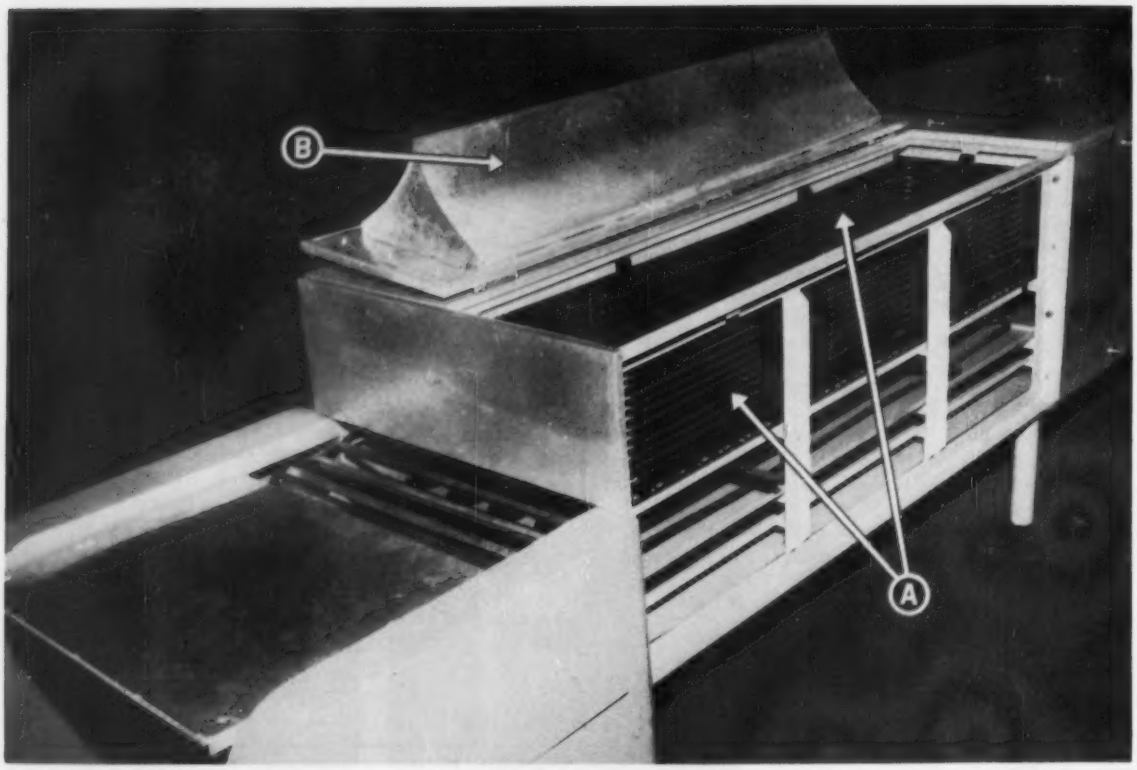
3 FOR CIP, vertical pipe (right) connects the raw product line (above tank) to recirculating line bottom). Second raw line (top) connects with special line from manufacturing department.



4 TWO-COMPARTMENT stainless tank in which the cleaning solutions are prepared and 10 hp. circulating pump are installed in special room. Note automatic steam regulator (top right).



5 IN FILLING ROOM, bends (foreground) connect lines that supply paper bottle units to form one continuous run of pipe through which cleaning solution is circulated. Glass and can filler lines are included.



LATEST ADVANCE in cooling units is this specially designed tunnel with vertical cooling coils (A) and reflector (B) that overcomes condensation. This radiant cooler has already proved out on cookies and chocolates.

Surprising Results Coming Up With

RADIANT COOLING

Foods can be internally cooled at faster rate to improve quality. . . . Operating and maintenance costs lowered. . . . Special tunnel designed

EDWIN H. MORGAN

Manager, Industrial Division, Reflectotherm, Inc., Cincinnati

Radiant cooling now takes its place as a valuable aid to food processing. Much interest has already been shown by bakers and confectioners in this new and radically different development. And its potential use in other branches of the food industry is evident.

Although described as radically different, this form of cooling is simply the application of radiant heating at a lower level (or reverse flow) in specially designed equipment.

Radiation, conduction, and convection comprise the three methods of heat transfer, by which energy is transmitted from one point or object to another. And equipment can be designed to simultaneously utilize one, two, or all three methods.

As for the average cooling tunnel, major mode of heat transfer is by convection. However, conduction can take place through the conveyor belt and radiation from product to surrounding surfaces. Nature of the surrounding tunnel surfaces, however, determines whether there will be a net loss of heat from the product by radiant means.

True radiant cooling of a variety of substances has produced startling results. Contrary to popular belief that cooling rate of the interior of a substance is dependent only upon its conductivity, actually some substances can be internally cooled at a faster rate when radiant release of energy is facilitated.

Application Cited

This has proved true in such items as cookie sandwiches, candy canes, chocolate, fiberglass insulation board, doughnuts, fig bars, peanut butter, and fondant. Already, an eastern food firm is considering radiant cooling of fish cakes. And any food product requiring heat removal during its manufacture can likely be cooled by the radiant method.

Radiant and convective cooling can

both be employed to shorten cooling time, reduce floor space requirements, or increase output from the same-sized equipment. In some cases, convective cooling produces undesirable results—excessive surface shrinkage and cracking, poor crystallization, sweating, disruption of pattern, or surface marking. Radiant cooling alone can be used to achieve the desired cooling and maintain quality or pattern.

Another advantage of radiant exchange is the relative independence of heat and moisture transfer. With a split system (radiation and convection), product temperature can be raised or lowered while its moisture content is independently maintained, raised or lowered.

Popular Belief

Fig. 1 illustrates the popular concept of heat release from a product. Here, internal heat is transferred by conduction from the center to the periphery. Heat at upper surface of product may leave by convection and (or) radiation. At bottom surface of product, heat is transmitted by conduction through the tray or conveyor belt and then convected and (or) radiated away. Convective component of heat release from product chiefly depends upon product-to-air temperature difference and air velocity. Convective-heat exchange varies directly as the temperature difference and as the 0.8 power of the velocity.

Radiant component of heat release depends principally upon the product-to-surrounding-surface temperature difference and the emissivity values of surfaces involved. Radiation varies as the fourth power of the absolute temperature difference.

It is obvious that cooling-tunnel design will determine which component is dominant. Conventional tunnels have been designed with accent on sanitation or aesthetics and, therefore, the use of stainless steel or aluminum interior surfaces. Such surfaces, however, are incapable of absorbing appreciable radiation from the product, and the tunnel will be almost completely convective. Even interior tunnel surfaces, which are highly absorptive, must maintain maximal temperature difference if the radiant component is to be of any magnitude.

This popular belief is definitely valid and in no way contradicted by the concept of radiant cooling to be discussed. It can be seen that positive steps can and should be taken to promote radiant exchange if for no other reason than to improve efficiency of heat transfer from product surface. Apparently, however, radiant cooling can bring additional benefits.

Experience indicates that radiation can occur from within certain substances as well as from the surface. Theory and mathematics for determining radiation from surfaces are well established. But there are no references in the literature to confirm or support the theory of direct radiation from the interior of substances. This theory, however, seems to be the only way to account for the results obtained with the items mentioned earlier.

Fig. 2 shows additional benefits obtainable (with certain substances) by encouraging radiant release of energy. Regardless of the magnitude of the convective component, use of radiant cooling will provide absorption of radiation from the surface *and from the interior.*

Case of the Cookies

To show the nature of radiant cooling, an actual experience is cited. Sandwich cookies were cooled to set the cream filler and facilitate packaging. They entered a convective-type tunnel at 87 F. and left at 77 F.

When subjected to radiant cooling (with no forced-air circulation), temperature change was identical but condition of the filler was radically different. The air-cooled sandwich still had a soft filler, whereas the radiant-cooled product's filler had set hard.

The amount of work (heat removal) done on the product in each case was the same, but work distribution was quite different. Radiation of heat from filler directly through the base cake is the only way to account for the shallower temperature gradient through product subjected to radiant cooling. Similar performance has been noted with other substances. Governing factor is that the product must be transparent to the radiant wave-lengths involved.

The theory can be logically proved as illustrated in Fig. 3. Here, two materials, "A" and "B", are indicated which may be the same or different substances. Temperature of the two

(Turn to page 155)

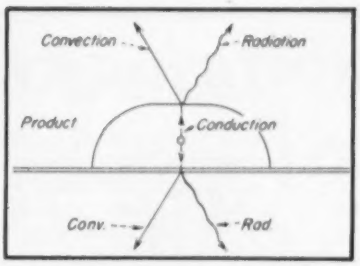


FIG. 1—Popular concept of heat release from product by conduction from center to periphery. It may also leave the product by convection and/or radiation.

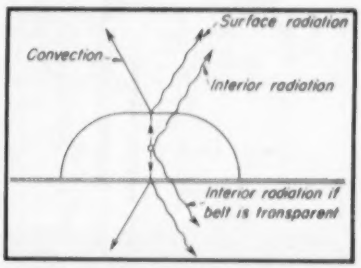


FIG. 2—How additional benefits can be obtained by encouraging radiant release of energy.

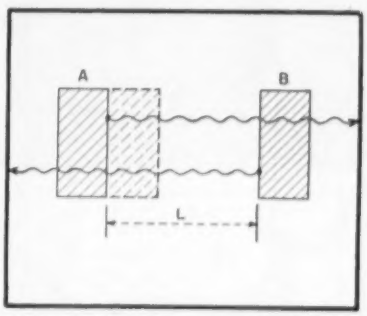


FIG. 3—Exchange of radiation remains unchanged as two materials come closer together ("L" is reduced)

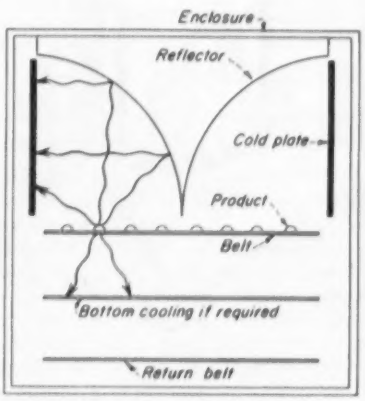
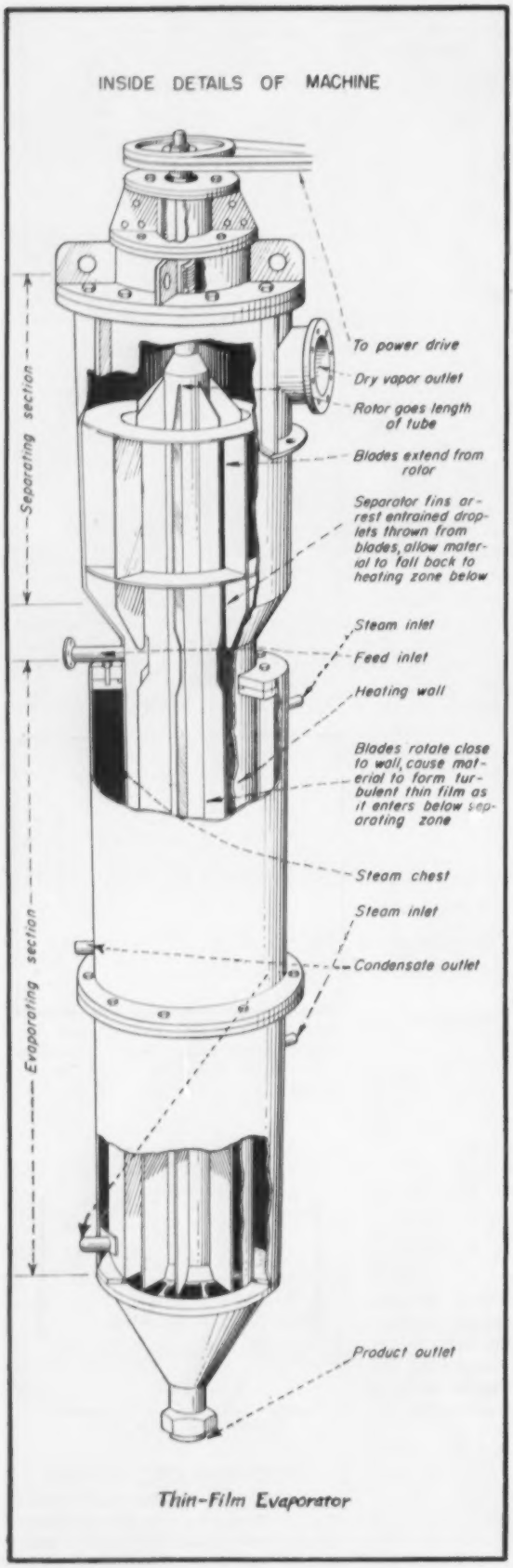


FIG. 4—How, through use of reflective surfaces, condensation in a cooling tunnel can be overcome.

About the Author

E. H. Morgan's experience covers 20 yr. in the field of heat and moisture exchange—most of it in the development of process systems for American Cyanimid Co. and National Biscuit Co.

He is registered as a professional engineer in Connecticut, New Jersey, and Ohio. And he holds membership in the American Society of Heating & Air Conditioning Engineers, the American Society of Refrigerating Engineers, and the National Society of Professional Engineers.—*The Editors*


INSIDE DETAILS OF MACHINE
Separating section
Evaporating section
To power drive
Dry vapor outlet
Rotor goes length of tube
Blades extend from rotor
Separator fins arrest entrained droplets thrown from blades, allow material to fall back to heating zone below
Steam inlet
Feed inlet
Heating wall
Blades rotate close to wall, cause material to form turbulent thin film as it enters below separating zone
Steam chest
Steam inlet
Condensate outlet
Product outlet

Thin-Film Evaporator

Solids Boosted by

Technique protects heat-sensitive foods since burning is curbed . . . Also: Rapid heat exchange with viscous products, nonstop cooking, effective steam refining

M. M. COSTON

Chemical Engineer, Manager, Process Equipment Div.
Rodney Hunt Machine Co., Orange, Mass.

Advanced engineering makes this evaporator radically different.

By successfully applying the turbulent, thin-film principle of heat transfer to heat-sensitive foods, it gains these notable benefits:

(1) Prevents local overheating and scaling, (2) ups the heat-transfer rate, (3) enables continuous quality control, and (4) is easily cleaned.

First, we will examine its unique construction and operation. Then we will continue (see below) with specific applications to a variety of foods.

Unit and Its Action

AS SEEN (cutaway, left), this evaporator consists essentially of a partially jacketed, stainless steel tube divided into an upper separating section and a lower evaporating zone.

Extending along its entire vertical axis is an internal rotor-agitator shaft with attached blades that clear the heating wall by $\frac{1}{32}$ in. Rim speed of blades is an important factor, but varies with the material. Normally, it is equivalent to 350 rpm. in a 26-in. dia. tube.

A motor, separately mounted for ease of removal, drives the rotor shaft. Vacuum is secured with a single or a multiple-stage ejector system, or a vacuum pump. And heating is usually by steam, though hot water, Dowtherm,

5 Food Uses

IN ACTUAL product application, this unit's performance is particularly significant in concentrating such "problem" products as soluble coffee extract, tomato paste and juice, fruit juices, and preserves—as well as in steam refining of edible oils. Normally, about a 5:1 concentration under vacuum is the maximum practicable in a single pass through the evaporator. However, it is feasible to operate two or more units in series.

1—Soluble Coffee

This product is made by extracting roasted, ground coffee with water and reducing the extract to a dry powder.

Operating conditions are a compromise between very high temperature for most efficient extraction and low temperature for minimum heat damage. In any case, there is a relatively dilute liquid which must be concentrated to make drying economical. And with a material as heat sensitive as coffee extract, minimizing exposure to high temperature is a controlling factor.

Concentrating may be accomplished either by recircu-

Spiralling, Thin-Film Evaporation

or any other suitable heat-transfer medium may be used.

At the top of the evaporator is a flooded mechanical shaft seal. The top bearing—thrust and radial—is of the ball or roller type. Bottom bearing, which is impregnated carbon, is inside the unit and located to be free of contamination by material being processed.

Its upper part (not heated) is expanded to contain an integral entrainment separator, and agitator blades extend into this section. Their centrifugal action throws any entrained droplets against stationary fins, where they coalesce, and return to the heating zone for evaporation. **This design feature is particularly important with foamy products, since carry-over of foam and/or entrainment is negligible.**

Usual evaporator accessories are needed—condenser, vacuum system, pumps, and instrumentation. Degree of concentration may be automatically controlled by instruments operating on boiling-point rise, density, viscosity, or other characteristic property.

Capacities, which vary with equipment size, range from 40 to 5,000 lb. of water evaporated per hour at 27 in. of vacuum and 30-psig. jacket steam. Table I summarizes approximate dimensions and service requirements.

The small quantity of material in the evaporator eliminates boiling-point elevation due to hydrostatic head. This permits handling of products with viscosities in excess of 20,000 cps. Furthermore, control of vapor binding keeps "U" values (overall heat transfer coefficients) high. These range from 100 to 500 over mean temperature differences of 25 to 175 F., and absolute pressures of ¼ in. of Hg to 1 atm. Typical heat-transfer data for several applications are cited in Table II.

Simple, compact design permits quick and economical installation. Because of low process hold-up, high capacity, and continuous operation, this requires less floor space than for conventional equipment. And flexibility—an important factor in multi-product operation—is gained by rapid changeover from one item to another.

Cleaning is minimized and simplified by the unit's method of operation, which practically eliminates formation of crusts or other deposits on heat-transfer surfaces. This allows longer service before intermediate or total cleaning. With many materials it is unnecessary to remove the rotor. Positive motion of the blades does the job with comparatively small amounts of cleaning solution. And even total cleaning is very simply accomplished after rotor and separator cage are removed.

Key to rapid heat flow is keeping material in a thin, mechanically-agitated film as it quickly passes through the unit by gravity. So fast is this action that required heating is done in seconds, thereby preventing burnt off-flavor of products.

Liquids or slurries entering the top of the evaporator section are instantly whirled against its heated wall by the blades. This forms a turbulent, thin film that is held to the wall by centrifugal force. The film spins down the chamber, is concentrated a predetermined amount, and flows out the bottom. Meanwhile, vapors rise into the separating section, deposit entrained droplets, and enter the condenser.

Turn Page →

ROTOR BLADES IN ACTION: Stroboscopic photo, taken vertically on a section just below feed point, shows film turbulence. Blades run counter-clockwise within about 1/32 in. of wall. (Here, two blades were shorted so camera could catch the action.)

---

lating the extract to build up the solids content or by evaporating water directly from the single-pass liquid. But recirculation is undesirable because it requires relatively high temperature to make it effective and also permits uptake of unwanted flavor components.

On the other hand, evaporation with conventional equipment is not the answer. For even with high liquid and vapor rates, a thing, stagnant film remains next to the heated surface and reaches its high temperature. Then, too, material is kept under heat for a relatively long time.

Specifically this was the knotty problem confronting Holiday Coffee Corp., Walpole, Mass.

But evaporation from an agitated, thin film (with Turba-Film unit) provided a simple solution. This now permits relatively low-temperature operation—in extraction, concentrating, and drying—for maximum flavor protection.

At Holiday, roasted coffee is specially ground for extraction in a battery of five jacketed, stainless steel columns, four of which operate while the fifth is being discharged and reloaded. Water enters at the bottom, flows up through the bed of each extractor in series (counterflow principle), and goes directly to the evaporator. Special column design and control of grind size make filtration unnecessary. Exposure to heat is minimized by using a high flow rate and also by not recirculating the extract.

Low temperature operation is carried through to the evaporator, where feed is continuously concentrated under vacuum in a single pass. Here, the thin product film is swept by rotor blades to provide rapid heat transfer and to prevent local overheating. Capacity of this unit is 300

Turn Page →

3 Other Functions

AS A HEAT EXCHANGER: Speedily heats (without evaporation) materials too viscous or scale-forming to be handled in tubular or plate exchangers.

AS A CONTINUOUS COOKER: Processes caramel, fondant, hard candy, and nougat in about 30 sec. Product comes out at 75 to 250 F., depending on original solids, desired final moisture, and the particular procedure used.

AS A STEAM REFINER: Strips fatty acids and other volatile impurities from edible oils, with negligible loss of neutral oil (see "5—Edible Oils" in accompanying text). Turbulent film permits close approach to true counter-current mass-transfer—fresh steam first contacting the cleanest (hardest to strip) oil.—*M.M.C.*

Unit and Its Action (Cont'd)

This unit realizes the theoretical advantages of the falling-film evaporator by overcoming its characteristic faults. It seems a simple matter to devise a heated tube into which may be fed a liquid that descends on the walls as a thin film, is heated briefly, and concentrated to a greater or lesser extent. But this seemingly simple process has several important defects.

First, the film, however thin, has some thickness, and the more viscous the liquid the greater this thickness. Because of interfacial friction, liquid closest to the wall lags, while that farthest away falls at a greater speed. Since heat transfer rate depends primarily upon properties of this film (temperature, viscosity, and thickness), liquid is unevenly heated and, therefore, unevenly concentrated.

Then, too, walls are rarely absolutely vertical, so that liquid falls more heavily on one side than the other. This again contributes to uneven heating and may cause a dry streak on one side which burns at the edges and deposits dry solids. As encrustation spreads, it is less likely that the entire tube wall will be kept continuously and uniformly wet. Rather, liquid separates in streams and detours burnt spots. This leads to more burned edges and gradual malfunction.

Attempts at eliminating these drawbacks resulted in recirculating concentrated liquid into the feed to establish sufficient flow through the tube. However, this increases the period of time-at-temperature. And for heat-sensitive items, this defeats the purpose of the falling film.

In contrast, the Turba-Film (as the advanced unit is designated by its maker, Rodney Hunt Machine Co., Orange Mass.) overcomes these defects by keeping the film under turbulent mechancial agitation, so that no wetting agent is needed. Though the equipment should be mounted vertically, a slight deviation has no effect on the process. With agitation, film thickness is always the same despite liquid's viscosity or speed of descent.

Each rotor blade carries a small wave of material ahead of it which, as it falls, continuously intermixes with the film through the small clearance between fin and wall. High rotor speed, by producing turbulence sufficient to reduce the effect of interfacial friction, provides uniform heating at the maximum heat transfer rate.

Thus, no product requires recirculation. Concentration, distillation, and heat treatment are carried out successfully in single passes. Short process time minimizes thermal decomposition and/or buildup of microorganisms. Furthermore, the variables—temperature, rate of turbulence, and process time—may be regulated to provide a high degree of quality control. Also, product condition can be continuously checked as the material leaves the evaporator—a money-saving advantage that eliminates reject runs.

Readers: Now continue with the story of this equipment's applications—"5 Food Uses," beginning bottom of p. 64.—The Editors

TABLE I—HOW CAPACITY, Dimensions, and Utilities Vary With Evaporator Size

Unit	Water Evaporated (Lb./Hr.)*	Dimensions Length (In.)	Dimensions Dia. (In.)	Heat-Transfer Area (Sq. Ft.)	Steam (Lb./Hr.)	Hp**
Lab.	40	42	9.5	1	50	0.5
No. 1	150	72	16	4	180	1.5
No. 2	300	107	26	9	330	2
No. 3	600	143	26	18	720	3
No. 4	1,200	162	42	33	1,400	5
No. 5	2,500	222	42	66	3,000	7.5
No. 6	5,000	300	64	141	6,000	10

* At 27 in. vacuum, 30 psig. jacket steam.
** For turning rotor.

TABLE II—TEST DATA Show Performances of Evaporator (No. 2 Unit) With Various Foods

	Products Studied			
	Coffee Extract	Candy Mix[1]	Gelatin[2]	Whole Egg
Concentrate Composition, Weight % Solids (bone dry)	70.2	87.5	27.5	50
Concentrate (lb./hr.)	96	1,141	220	100[3]
Product Temperature (F.)	120	185	140	...
Chamber Vacuum (in. Hg)	26.5	20.6	22.0	27.5
Vapor Temperature (F.)	116	149	148	95
Jacket Temperature (F.)	213	235	228	270
Steam Pressure (psig.)	1	17	8.2	30
Feed Composition, Weight % Solids (bone dry)	15.0	80.0	16.5	25
Feed Rate (lb./hr.)	450	1,240	442	200
Feed Temperature (F.)	130	149	143	75
Vapor Rate (lb./hr.)	354	99	222	100[4]
Rotor Peripheral Speed (fps.)	43.7	18.8	35.0	43.7
Agitator Power (kw.)	0.95	1.52	1.8	1.3
Heat Transferred (1,000 Btu./hr.)	358	100	225	108
Overall Coefficient, "U", But./hr. (sq. ft.)(deg. F.)	447	170	334	73

[1] Essentially condensed milk, fat, corn syrup, and water.
[2] Bloom strength 260.
[3] Product compares favorably with frozen whole eggs.
[4] Initial vapor rate, about 250 lb. per hr., decreased in 2 hr. to 100 lb. per hr. due to build-up on heat-transfer surface, then remained steady.

5 Food Uses (Cont'd)

lb. of water evaporated per hour, and concentrate leaves at about 45% solids. Next, it goes to a weigh tank to be sampled for quality control, then to a belt-type dryer.

In addition to permitting low-temperature processing, this evaporator adds flexibility to the operation. Production is controlled by dryer capacity. To increase it, more water is removed (within limits) by the evaporator in order to reduce the load on the dryer. And conversely, load on the evaporator can be shifted to the dryer.

2—Tomato Paste and Juice

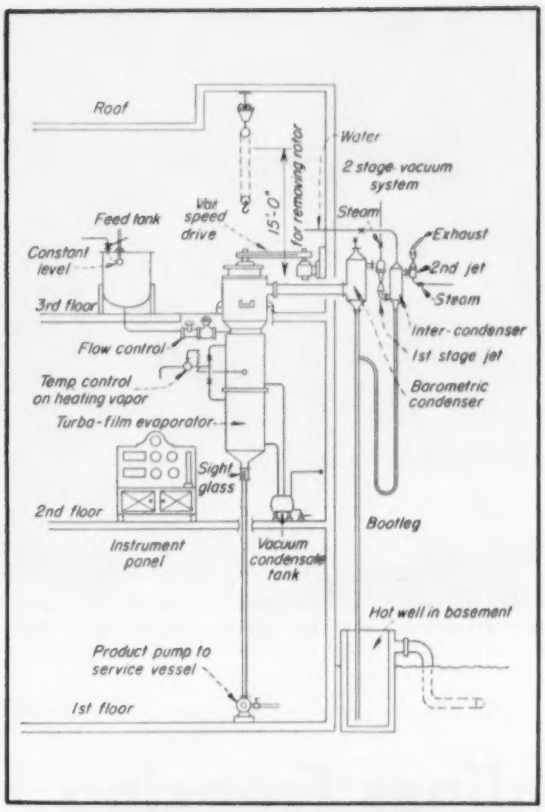
Because tomato products usually are bulk-packed in one place and canned elsewhere, it is economically desirable to concentrate at the source—as much as can be done without impairing quality. Generally, it's not possible to concentrate tomato paste to more than 30% solids with conventional equipment because the product becomes so stiff that it ceases to flow and burns in the heated tubes.

But both pilot-plant and commercial operations show that high-quality tomato paste with solids as high as 50%, can be produced in an agitated evaporator. Process is continuous, and usually is carried out in a single pass requiring a few seconds. This may be under partial vacuum to decrease product temperature, or at atmospheric pressure. Latter insures an exit temperature sufficiently high to pasteurize the paste, and also permits higher concentration.

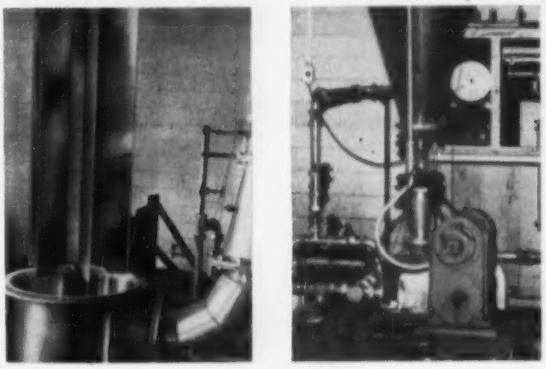
Although concentrating to 40-50% solids usually requires only a single pass here, it is ordinarily desirable to do it in two steps when going to 60% solids from the usual starting point of 11%. Or two units might be operated in series. In the first pass, product can be concentrated to about 25% solids and then to 60% in the second. And where conventional single or multi-effect evaporators (which easily reach 25% solids) are in service, film units can be operated as final-step concentrators.

Another application is for tomato juice, which can be concentrated with equal success to even higher solids content. With starting solids of 5.5%, it is simple to get 70% solids in a single pass, and 80% in a two-pass operation similar to that described above. Our tabulation "Results" (next page) summarizes typical working data.

Finally, this unit can do double duty by acting as a



←Setup for Tomato Products↓



HIGH-CAPACITY unit concentrates tomato pulp from 11% to 40% solids in single, rapid pass. Product rate is 11.5 lb. per hr. per sq. ft. of heating surface. Left: Closeup shows dry vapor outlet and rotor blades lifted out. Right: Bottom section of evaporator with product outlet.

Results With Tomato Paste and Juice

Item	Original Solids (%)	Input (Lb./Hr.)	Final Solids (%)	Product (Lb./Hr.)
Tomato Paste*	11	2,760	40	760
	11	2,450	50	540
	30	8,000	40	6,000
	30	5,000	50	3,000
Tomato Juice**	5½	2,170	70	170
	5½	2,150	80***	150
	25	3,100	70	1,100

* In No. 5 unit at 1 atm. and 35 psi. steam. ** In No. 5 unit at 1 atm. and 25 psi. steam. *** Two passes.

product heater. High-density paste, made in tubular evaporators under the high vacuum required for product protection, does not readily flow into cans. Therefore, it usually is put through a tubular heater–in which "burn-on" necessitates frequent shutdown for purposes of cleaning.

But this heating can easily be done in an agitated unit. Here, short contact time permits concentration at higher temperature (lower vacuum) so that high-density paste flows readily and burning is avoided.

3—Fruit Juices

Today's accent on quality-controlled juice concentrates –items that cut container requirements and handling costs –has occasioned particular interest in the thin-film evaporation method. And it has, in fact, been successfully applied to a variety of types and concentrations of fruit juices–including orange, grape, and pineapple.

With orange juice, a superior-quality 4:1 concentrate can be produced by using an evaporation temperature of 80 F., and vacuum steam at 160 F. for heating.

A high-Brix product (70-75 deg.) can be made with quality equal to that of the present 4:1 concentrate. Furthermore, pilot-plant tests indicate that an 80-deg. concentrate has acceptable quality.

Where taste considerations are not so rigid–as in soft drinks–a satisfactory concentrate may be produced under a vacuum of about 2 in. of Hg and with 212 F. steam in the jacket. Corresponding to 100-115 F. evaporation, this eliminates employment of elaborate high-vacuum systems.

Grape juice can be concentrated from 16 to 32% solids at feed and product rates of 5,000 and 2,500 lb. per hr., respectively. Apple pectin solution, and black and red raspberry juices are handled at full capacity (based on water). And these materials have been taken up to 70% solids without any noticeable loss of flavor or evaporator capacity.

Evaporation rates can, of course, be controlled by varying steam pressure or vacuum.

4—Jams, Jellies, Preserves

Grape and apple jelly, also grape jam, have comparable evaporation characteristics. Relatively high heat-transfer rates are obtained (U values of about 400).

For example, a typical unit produces about 182 lb. per

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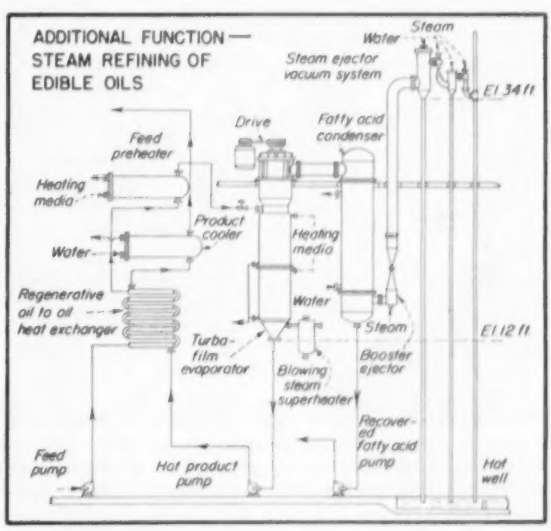
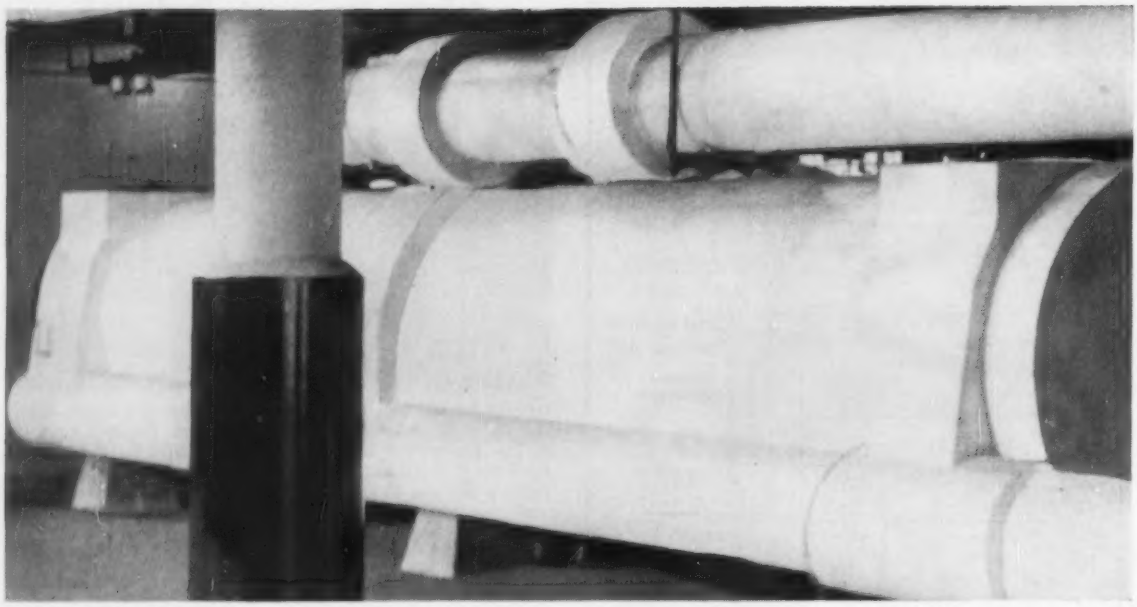




IMMERSION FREEZER was selected for fast heat removal, high throughput, and continuous operation without manual attention. Two of the units, located side by side, are operated in series. Cans transfer automatically from one to next.

Campbell Streamlines Freezing

Continuous immersion process freezes quality into soups fast and efficiently. Plant has pace-setting advances in heat removal, refrigeration, handling, safety, and building construction

FRANK K. LAWLER
Editor, "Food Engineering"

Combine that certain subtle excellence in flavor with pace-setting production efficiency and you're really out in front. And that is just what Campbell Soup Company, Camden, N. J., has achieved in its highly successful frozen soup operation.

By quick freezing quickly after cooking and canning, Campbell seals in that fresh-made taste.

By advanced process engineering, the company has introduced a high degree of economy in quick freezing, packaging, and freezer storage. It has, in fact, come up with a pushbutton, virtually automatic, freezing plant. And this is housed in a new structure "built around" the operation, designed for twofold expansion in capacity, and equipped with many advanced safety features.

Study Different Ways

After market tests revealed a strong consumer demand for frozen delicate-flavored soups, Campbell engineers went to work on the factory to produce them. They analyzed the merits of different freezing systems and selected one. Then they "Campbellized" it by introducing innovations.

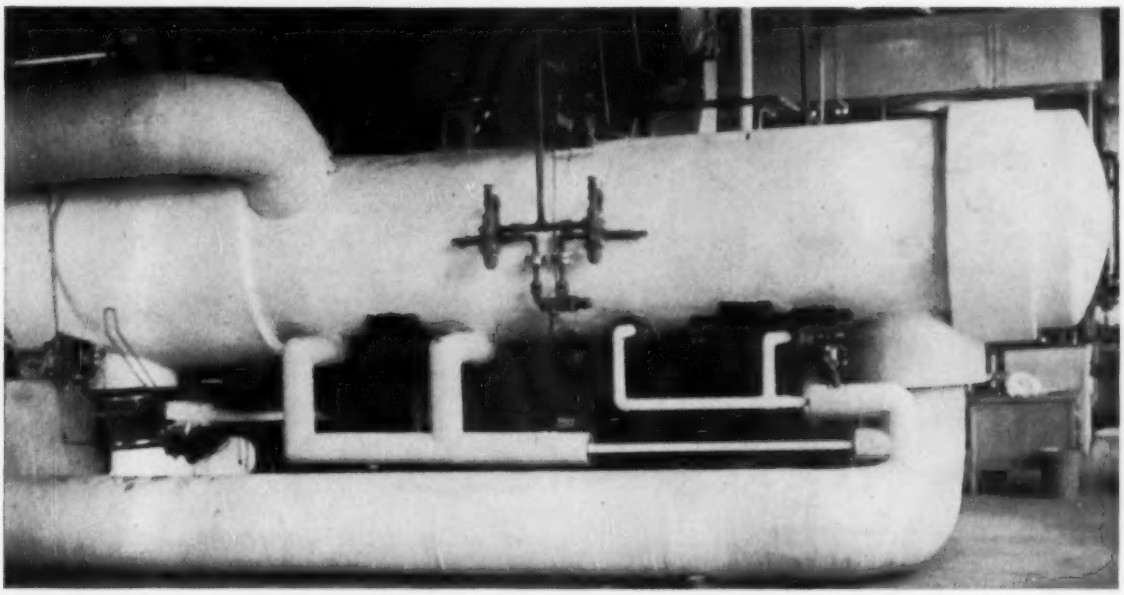
Next they designed a new three-story plant to house the processing, packaging, and storage facilities. No time was wasted. Construction started in June, 1953, and canned frozen soup was being produced in February, 1954.

Advanced Immersion Freezer

Because of its fast heat removal, high throughput, and continuous operation without manual attention, an immersion freezer of Food Machinery & Chemical Corp. was selected. Can tracks on the freezer shell move the cans from one end of the freezer to the other.

Two of these freezer units are located side by side, and operated in series in a U-circuit to double the distance of can travel in the refrigerant. As they discharge from the first section, the cans are transferred automatically by conveyor to the second section. Cans enter and leave the units through pockets in a rotary device which closes the opening against the escape of any significant volume of fumes.

Circulated by a 100-hp. pump, at a rate of 1,800 gpm., the below-zero refrigerant from the chilling heat exchanger enters each freezer unit at the top through a distributor. Then it flows in both directions toward the ends of the freezer. This removes the heat so rapidly that the canned soup freezes in 30 minutes or less, even though cans enter the freezer at a hot 190 deg. F. It takes some



REFRIGERANT is cooled to subzero in big shell-and-tube heat exchanger, being circulated to freezer by 100-hp. pump. Insulation on 300-ton-capacity exchanger, as well as freezer and pipes, is moisture- and fire-proof preformed Foamglas, 3 to 9 in. thick.

7,000 gal. of freezing fluid to fill the space between drum and shell in each freezer.

It is significant that there is no precooling step ahead of the freezer. Calculations by a consulting refrigeration engineer proved that it is more economical to take all the Btu.'s put of the soup in the freezer. Besides, the cans do not pick up moisture, as they would in pre-cooling, to dilute the freezing fluid. This means that the refrigerant doesn't have to be reconditioned as often.

A special refrigerant was selected for the freezer. It has just the right viscosity, correct moisture absorption characteristics, and the desired heat conductivity.

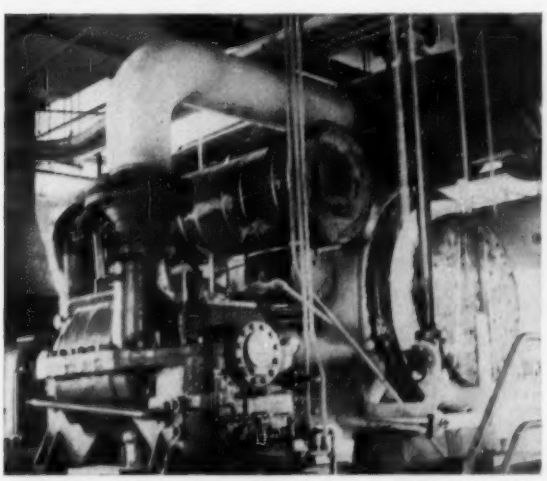
While loss of freezing fluid carried out of the freezer on can surfaces is not a major factor, the cans are passed through a revolving-brush machine to recover most of the adhering refrigerant.

Heat which freezing fluid removes from the soup is extracted in a large York horizontal shell-and-tube heat exchanger with 300 tons of cooling capacity, located end-to-end with the first freezer section.

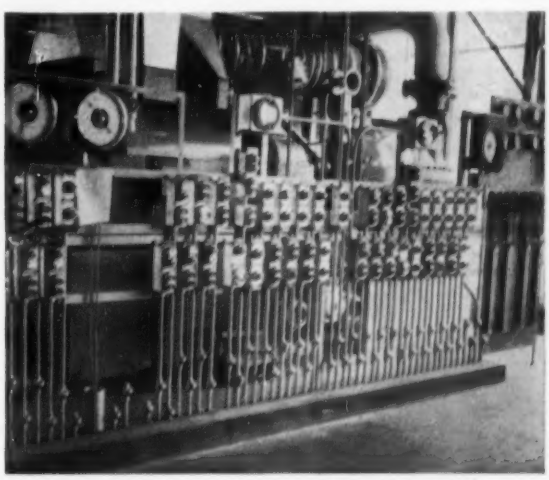
All of the freezing and refrigerating equipment operates automatically after a pushbutton start. One man watches the instruments and signal lights, and is available in event of any malperformance in the system.

No Chances With Safety

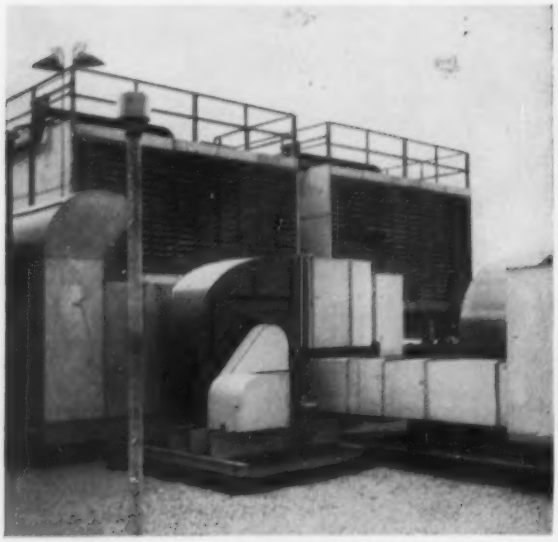
All controls are interlocked so that everything functions in the proper sequence. The operation cannot be started unless the ventilating fans for the freezer room and the compressor motors are running. And everything shuts down automatically if a ventilator blower stops. Even the



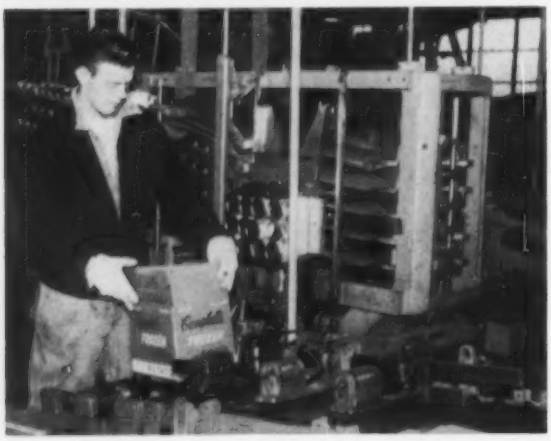
COMPRESSOR of centrifugal type (left) supplies refrigeration to heat exchanger. It is driven at varying speed by a wound-rotor motor to conform with freezer load. Condenser (right) uses water from cooling tower.



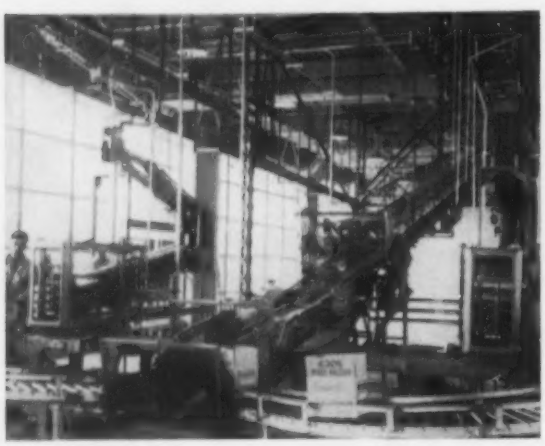
CONTROL PANEL centralizes pushbuttons, signal lights, and instruments for freezing and refrigeration operations. Entire system is automatic, even to safety shut-down controls.



ON ROOF of plant is twin down-draft cooling tower for condenser water. Near it are blowers and ducts to ventilate plant and cool compressor motors.



CASERS in packaging department adjacent to freezer room automatically assemble cans of frozen soup and push them into shipping containers set up by operators.



AUTOMATIC SEALER glues and folds flaps, and holds cases under sealing pressure during travel between belts. It inclines upward, frees floor space.

refrigerant in the freezers is automatically dumped into basement tanks by pneumatic valves if any trouble should develop.

With these controls, there is very little chance that coolant fumes will create an explosion hazard. But as added precautions, levers are located at the freezer room door for manually dumping the coolant, and a portable gas detector checks fume concentration in the room. To date there had been no hazardous accumulation of fumes, and when the writer visited the plant no odor was noticeable.

Advanced Electrical Engineering

As other safeguards, all electrical equipment is explosion-proof, and the compressor motors are totally enclosed. These motors have cooling fans that draw air from vents on the roof, pass it over the windings, and discharge it to the roof.

To vary the speed and capacity of the centrifugal compressors with the freezer load for efficiency, the motors are equipped with wound rotors. And speed is varied by air-cooled rheostats located on the roof. All electrical conduits passing through the floor of the freezer room are sealed so the fumes cannot escape through openings to other parts of the building.

Another feature of the modern electrical engineering in the plant is the efficient use of a 4,160 v. power supply to the compressor motors, and 440 v. for other equipment in the plant.

Modern package-type unitized switchgear and transformers are safely located in a separate room below the freezer floor. And under that is an isolated pump room.

Three 14,000-gal. tanks are in the basement room. One is the dump tank, another is for the new refrigerant supply, and a third holds used coolant that is to be reconditioned. Tank trucks deliver new freezing fluid and haul the used to the reconditioning plant, where moisture and any other foreign material is removed.

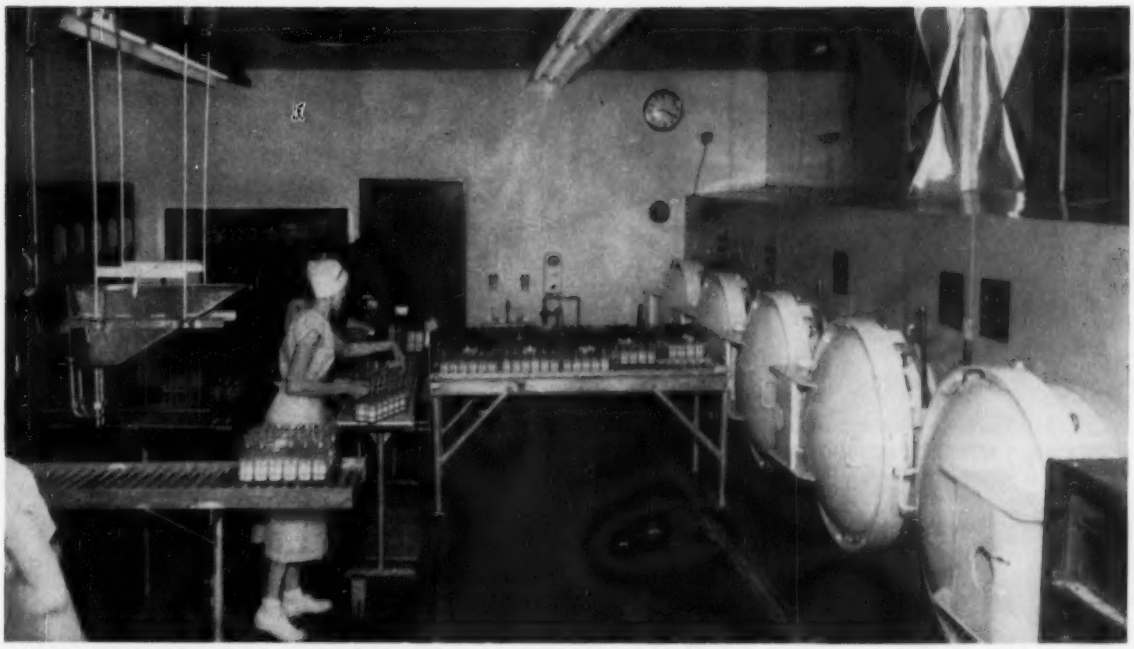
Unusual Building Features

A reinforced-concrete building of flat-slab construction and brick veneer, the 80 x 272 ft plant is three stories high, with basement under one end.

The freezer and compressor room (140 ft. long) and the packaging department (132 ft.) occupy the space on the top

(*Turn to page 241*)

IN PALLETIZING room, held at 30 deg., men transfer cases to pallets. Lift trucks carry pallet loads into —5 deg. storage room and tier them.



IMMACULATE new plant of Baby Formula Co. is conveyorized, eliminating worker fatigue. Automatic controls assure efficient, safe sterilization of product. From fillers (left) product moves to capping conveyor, then is transferred to mobile conveyor (center) which shuttles on rails to feed different sterilizers (right).

Unique *Infant* Food Plant Grows to *Adult* Size

From a toddling start in '47 with two part-time employees, it has speedily matured into a striking $160,000 facility—hygienically designed, entirely conveyorized, and featuring automatic controls. . . . Exemplifies strategic planning to meet special-function problems

C. R. HAVIGHORST
Senior Associate Editor, "Food Engineering"

"*Unlike most other foods, our food products are never consumed by the final purchasers.*" And this paradox becomes more complex because product-quality characteristics aren't evaluated by the consumers, but instead by the purchasers.

"Now, if this isn't enough to confuse you," said Edward Wenner, Baby Formulas Co., San Francisco, "Listen to this—

"There are only two quality characteristics necessary for our product: It should be sterile and it should be properly nutritive. There are no other requirements, such as color, flavor, odor, or texture.

"Of course," he continued, "the explanation lies in our type of product—infant formulas, produced on orders from hospital nurseries, pediatric departments, and private subscribers. They gage quality on the preciseness with which the formulas are compounded and on formula sterility. Infants, our final consumers, are unable to taste at this stage of life, their taste buds not having developed sufficiently. And they seem oblivious to food odors.

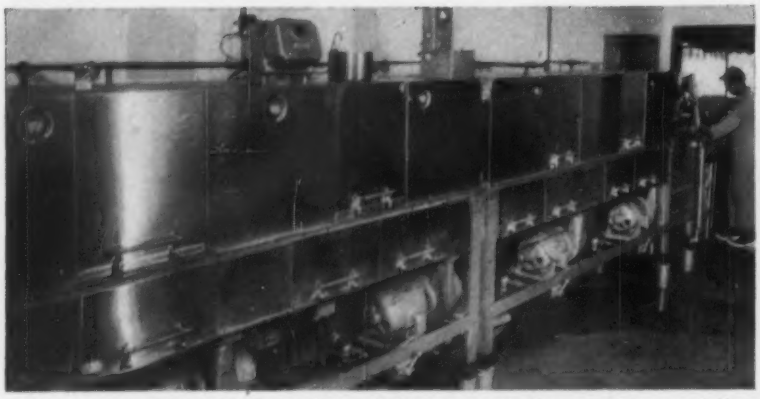
"But, don't think by this explanation," he countered, "that we lack production problems and that our customers aren't particular just because they're interested in only two quality characteristics. Actually, they're more than particular—they're meticulous. That's why Baby Formulas Co. carries on a prescription-type food operation, where an increasing, daily flow of prescriptions is filled now by mass-production methods."

Vigorous Growth

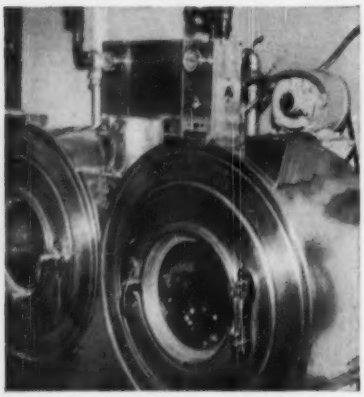
For evidence that the company is operating successfully under these exacting conditions, one need only note its continued growth since opening in 1947.

The equipment used in the first

7 Stages of Precise-Plus

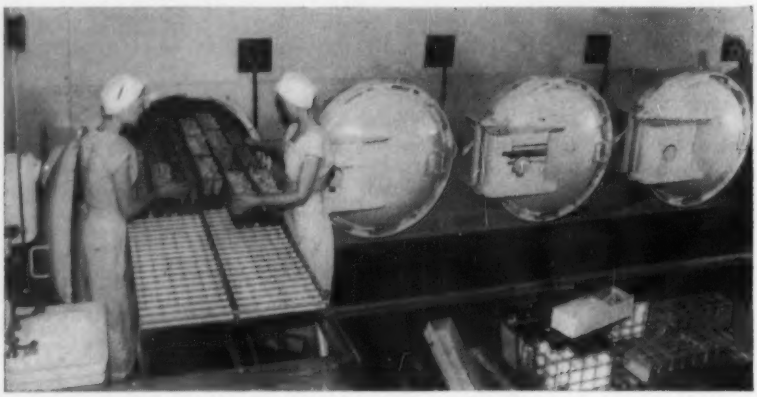


1 **FRESHLY STERILIZED** baskets of bottles move through this specially-designed 5-stage washer. They then continue on to the filling station.



2 **THIS CLOTHES WASHER** gives nipples a 4-stage wash.

5 **BASKETS** of filled bottles get tags which tell types of nipples or cap closures to employ.



6 **ROLLER UNIT** on shuttling rail-borne conveyor is unlocked and moved forward on frame to join fixed conveyor in sterilizer. Then charge is pushed in. Lights in panels (red and green) show when units are in use.

plant was adapted from other processes or devised for the specific purposes. The entire staff consisted of two part-time employees–a registered nurse and a delivery man.

Within four years, customers included nine Bay Area hospitals and over 600 home subscribers (*Food Industries* Aug. '50, p. 40). Continuing steady growth necessitated construction of a new $160,000 plant with facilities and processing line designed specifically for the production of infant formulas.

This plant is the first in the world to be erected for commercial production of formulas by prescription. Today, it serves 24 Bay Area hospitals as regular customers. Overall, the company is feeding more than 30,000 new-born infants annually and, in addition, supplying 200 daily feedings for pediatric departments. And further it has approximately 12,000 (annual) home customers.

Mr. Wenner elaborated: "Our business has experienced this sound growth due to two major reasons: First, our production of a sterile product, eliminating the ever-present hazard of epidemic diarrhea and of cross-infection. Second, hospitals, all over the nation desperately call for more rooms, and our service abolishes need for a hospital formula room.

Of equal importance are the cost savings thus resulting. Here, all of our hospital customers are profiting. One of them is recording annual savings of nearly $4,500."

R_x for Production

Two experienced operators process the daily orders (prescriptions). They are first checked and translated for the processing laboratory. Some are written in cubic centimeters or ounces. Others are only partially worked-out, and may not correspond to the total volume required for the feeding. Orders are clarified by consulting charts and increasing or decreasing rations. The formula is completed and rechecked with the origin of the order for positive insurance.

Special orders–those other than for the standard formulas, of which there are twelve–are typed on cards in code and clipped to the canisters in which the formulas are compounded. Thereafter, throughout the process, this card remains attached to the wire basket containing the bottled formula. It is included in the finished product package and delivered with it. Standard formulas, labeled as such, are made in volume.

Processing Laboratory

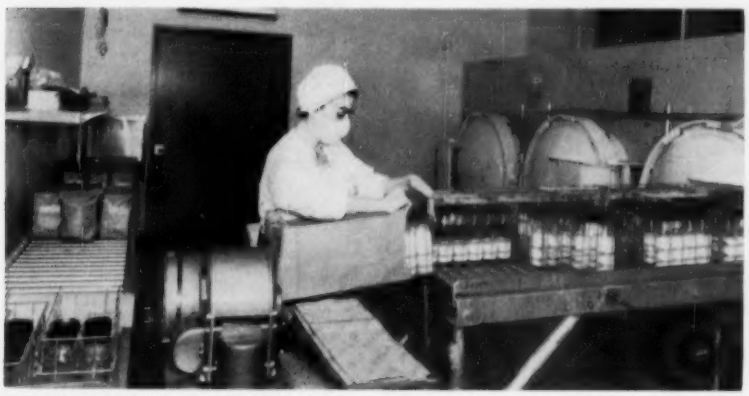
The laboratory and packaging departments are separated by a blue tiled wall into which the five sterilizers (retorts) are set, and atop which is a glass partition.

Sanitary precautions, designed into this plant, include germicidal lamps, air purification, smooth-finished concrete floors, and walls painted with hospital type white paint. Both laboratory and packaging rooms are kept under slight air pressure by forced ventilation, thus balking entry of out-

Baby-Formula Processing

3 **FORMULA COMPOUNDING.** Only stainless steel or glass are used. Coded tags clip to canisters.

4 **FILLING** at 12-spout machine. Conveyor (front) delivers freshly-washed bottles. 2-spout filler is seen left).



7 **REMOVED WITH RAKE** (seen atop sterilizers), finished charges come into packaging room. Wrapped baskets are labeled from code tags and moved on conveyor through wall aperture and into storage (45 deg. F.).

side air when doors or other apertures are opened.

Product flow is conveyorized throughout the plant, from bottle washer to storage room. Conveyors are at easy working level, eliminating need for lifting, and reducing worker fatigue to a minimum.

One wall of the "raw" material storage room is directly adjacent to the formula compounding station. Pasteurized ingredients, requiring refrigeration, are supplied from the storage-room side into a two-way refrigerator, located in this wall. Canned and glassed ingredients are fed through a two-way, shelved cabinet, in which they roll down tracked shelves.

The compounding station, and all utensils used here and throughout the process wherever product contact is made, are of stainless steel or glass. The stainless bench has a perforated top, kept clean by frequent flushing with water. The large canisters, on the top shelf, contain primary ingredients—evaporated milk, fresh milk, carbohydrates in solution, spray dried milk in solution. These are filled into a measuring container by tripping a valve.

The big batches of hospital or standard stock are mixed in a large tank, equipped with an agitator and pump. This stock is transferred, through overhead pipes, to one of the three filling units. Product mixed in the smaller canisters is manually poured into a filler reservoir.

Bottle Washing

In a room adjoining the processing laboratory, returned bottles are washed in a 5-stage washer, specially designed for this use. They move through this unit in inverted position, in baskets. The first stage is a 140-deg.-F. water rinse. This is followed by two 175-F. soap-solution washes. Residual soap is removed by a 175-F. water rinse and, finally, the bottles are rinsed with 190-F. water.

In this same room, nipples are subjected to a 4-stage wash: A 180-F. alkaline soap solution, 175-F. lightly chlorinated water, then two rinses in 175-F. water.

Baskets of sterilized bottles move on a conveyor belt, through a small wall aperture to the filling station. Nipples are collected in stainless steel

(*Turn to page 155*)

Plant Does Schooling Job, Too

SUPERSEDED is former formula training at hospitals. Student nurses now come to company's plant classroom for study under Registered Nurse.

Does Refrigeration Help Them? Tests Have Now Given the Answer

THESE ATTRACTIVE CONFECTIONS were among 250 kinds specially tested to learn the advantages and disadvantages of freezing. About 85% were unchanged, a few cracked and some were improved in texture.

Age-Old Candy Problems Solved by Freezing

• Shelf-Life Extended • Production Schedules Bettered
• A Number of Confections Improved

J. G. WOODROOF
Georgia Experiment Station, Experiment, Ga.

Confections, too, are now full-fledged members of the ever-expanding family of frozen foods.

And one doesn't have to go far to find the reasons.

►**Freezing (1) maintains initial quality of candy over long periods, curbing staling and development of rancidity; (2) enables more stable production and employment; while (3) product quality of some of the candies is actually improved.**

Specifically, the fact that freezing preserves the confections permits manufacture during those periods when sales are slack, with the products then being held ready for sale to meet special-season demand—Christmas, Valentine's Day, Easter, Mother's Day, Thanksgiving.

This is especially advantageous for manufacturers having chain store or mail order outlets that call for stockpiling candies for sale in highly competitive markets. Coming out of frozen storage, the confections are carefully thawed in the unopened packages, then sold at retail as "fresh" candies.

►**Today, the "freezing way" is on a solid footing, backed by a number of years of substantial research, followed by commercial application of the findings.**

Pertinent here is the exhaustive study made at Georgia Experiment Station in cooperation with the National Confectioners Assn., the Refrigeration Research Foundation, and several candy makers. Goals of this investigation were the following determinations:

1. Advantages and disadvantages of freezing candy.

2. Varieties of candies suitable for freezing.

3. Behavior of frozen candies after thawing.

In the course of these experiments, extending over 5 yr., more than 250 varieties of candies were stored or shipped at temperatures ranging from −10 deg. to −117 deg. F. (dry ice refrigerant).

In addition to laboratory research, one warehouse in the Midwest stored 2½ million pounds of boxed candies at 0 to −10 F. in 1954. Many of the products involved in these tests were found to be in excellent condition after 9 months' storage. In fact, experiments have shown that candies stored at this temperature retain full quality about twice as long as when stored at 34-36 F.

The frozen candies may be held in the same room with other frozen products, but candies merely refrigerated (not frozen) must be kept in a separate room to insure proper humidity and an atmosphere free of contaminating odors.

Thawing of these candies was accomplished in several ways. Some of the samples were thawed by moving them from 0 F. to several intermediate temperatures (6 to 12 hr. stages) before opening them at room temperature. And some were immediately transferred to room temperature and opened directly.

Still other samples removed from 0 F. were allowed to reach room temperature before being opened. And others were directly opened and carefully examined at 0 F.

Sold Frozen, Too

A more recent development is that of retailing "frozen candies" from low-temperature cabinets in candy shops and specialty food stores. Most candies may be treated in this manner, but especially suitable are divinities, soft creams, and chocolate coated candies with soft centers.

However, candy freezing has not been clear sailing with all varities. Two major problems have been encountered. First, while most candies are uninjured by freezing, spun candy chips, certain of the chocolate coated nuts, brittles, toffees, and some creams tend to crack when subjected to 0 F. Second, moisture condensation frequently causes "sugar blooming" when candies are removed from freezing storage. It has been found here that while step-by-step tempering to 70 F. is beneficial in preventing the moisture condensation, the real solution lies in protective packages. Boxed candies are usually adequately packaged to guard them against the bloom. On the other hand, many chocolate bars and bulk candies are not.

When moisture-proof packages with considerable padding were used and they remained unopened until room temperature was reached, moisture condensation and sugar blooming was completely overcome.

Judges Decide

On the basis of close examination by a panel of judges, the candies were grouped into (1) those that remained unchanged after being frozen and gradually returned to room temperature in unopened packages, (2) those that were freshened, mellowed, or rendered more uniform in consistency by freezing and thawing, and (3) those that burst, cracked, lost flavor, or sugared on freezing.

Candies whose finish, texture, and structure were unchanged by freezing included all chocolate coated items with soft or semi-soft centers, hard candies of all kinds (except bars of pulled candies), panned candies, French creams, glazed creams, crystallized hard creams, and most brittles and spun candies. Pieces individually wrapped in foil, cellophane, or glassine were generally unchanged. Further, freezing did not effect the tendency for caramels to sugar or gray.

Quality of certain candies was actually improved in freshness and mellowness or were rendered smoother in texture by the freezing. Included in this group are those with high moisture content and without protective coating or individual wrapping, especially those candies ordinarily subjected to surface drying.

Some Improved

Types here that were bettered were marshmallows, jellies, caramels, fudges, divinities, cocoanut macaroons, fruit loaves, cocoanut bonbons, panned Easter eggs, malted milk bars, and chocolate puffs. The freezing reduced surface "case hardening" and in some instances cut down surface cracking due to drying.

Mellowing was apparently accentu-

IMPROVED

—In Freshness, Mellowness, and/or Smoothness When Frozen and Subsequently Properly Warmed

Almond Toffee, Brazil Caramels, Butter Bon-Bons, Caramel-Coated Coconut, Caramel-Coated English Toffee, Caramel Nougats, Coconut Bon-Bons, Coconut Fruit Loaf, Coconut Macaroons, Creamed Almonds, Divinity, Divinity With Nuts (almonds, pecans, walnuts), Easter Eggs (panned), Filbert Truffles, Fudge, Fudge With Nuts (almonds, pecans, walnuts), Hard Cream Fruit Centers, Jellies (gum drops, jelly bars, butterscotch and fruit flavors), Jelly Marsh, Nut Rolls (soft centers, with Brazil nuts, pecans, walnuts), Opera Cream Caramels, Orange Jelly Slices.

Chocolate Items: Almond Caramels, Nut Clusters (Brazil nuts, peanuts, pecans), Puffs, Soft Cream Drops.

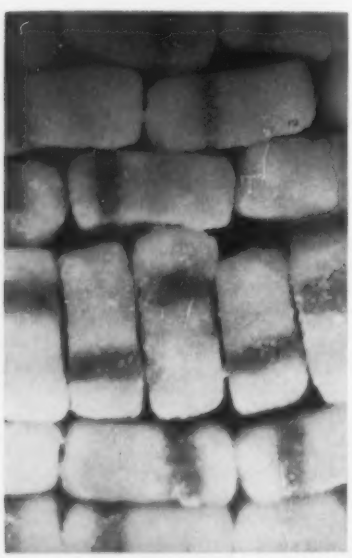
Chocolate-Coated Items: Caramel-Covered English Toffee, Fudge Bars, Malted Milk Balls, Marshmallows, Nuts (almonds, Brazil nuts, peanuts, pecans, walnuts), Soft Cream Mints.

INJURED

—When Subjected to the Freezing Techniques

CANDY ITEMS	NATURE OF DAMAGE
Almond Puffs	Slight cracking of chocolate coating
Almonds in Caramel	Coating slightly cracked
Caramel Brazils	Coating very slightly cracked
Chocolate-Coated Honeycomb Chips (with medium-thin cell walls—mint, peanut butter, molasses)	Slight splitting of centers lengthwise, and slight crumbling
Chocolate-Coated Honeycomb Chips (very thin cell walls)	Centers split lengthwise, though bond between chocolate and centers unbroken
Chocolate Plain Brazils	Coating very slightly cracked
Fluff Nut & Fruit Easter Eggs	Had Off-Odor in Centers
Lemon in Caramel	Coating very slightly cracked
Mellow Mints	Cracks running throughout centers
Nut Toffee	Coating cracked
Old-Fashioned Chocolate Drops	Centers sugared and too soft
Peanut Brittle	Coating cracked
Peanut Butter Spun Bars (cream or chocolate coating)	Centers slightly gummy
Plantation Coconut	Coating slightly cracked
Twin Almonds	Coating slightly cracked
Vanilla Caramels	Coating slightly cracked

FOUR VARIETIES of chocolate-coated spun candy chips split or crumbled (left) when stored at 0 F. Compare with unfrozen, normal pieces (right).



COCONUT SQUARES (½-oz. blocks of hard cream and shredded coconut, in different colors and flavors) were among several kinds of candy made "fresher," mellower, and/or smoother in texture by freezing.

ated by freezing and thawing. This was particularly noticeable with candies containing fruits and nuts.

Those That Are Injured

Confections harmed by freezing included the aforesaid specific spun types, chips (especially those with fine holes and thin cell walls), chocolate coated hard candies and Brazil nuts, and caramels.

They ranged in moisture content from 16 to 18% in a few varieties, 10-12% in most chocolate covered soft candies, 1-2% in brittles and hard candies. Since injury was not related to moisture content it was decided that cracking or splitting of pieces was due more to differential expansion of different layers than to the formation of ice crystals.

When only the chocolate coating fractures, the cracks seem to close on thawing and warming. In some cases the cracks in the chocolate coating extended to the center of the pieces, as with mellow thins. But in most cases the cracks went only through the chocolate coating.

In a few instances, the bond between the chocolate coating and the layer beneath was not broken, as with orange-pineapple creams and peanut puffs. Generally where the chocolate was directly on a hard surface, the bond was broken and the chocolate peeled off.

In each of these surface injuries due to freezing, the size of the cracks decreased as the candy thawed, and after remaining at room temperature about 12 hr. the cracks (with the exception of those in the specific spun candy and chips) were detected only with difficulty. Butter almond toffee was severely cracked while frozen, but after 12 hr. at room temperature no cracks were noted, even with a hand lens.

In one instance, chocolate coated soft creams became more "runny" due to possible breaking of the emulsion on freezing. In another case, peanut butter spun bars increased in stickiness. And in a third case nut and fruit Easter eggs aparently had an off-flavor.

Injury due to cracking was reflected in shorter shelf-life. Individual cracked pieces dried on the inside and became stale or rancid quite rapidly, depending on the severity of the surface injury. Often, the shelf-life was reduced to one-half by the cracks in the chocolate coating.

Temperature of Freezing

Little effect on texture was traceable to temperature of freezing. Whether candies were frozen at −10 or at −170 F. produced small difference on quality. Most candies in the test were those which previous experiments had shown to be either improved or injured by freezing at −10 deg. All except spun-candy chips behaved similarly.

Temperatures recorded by Mantey* in centers of cream candies placed in the middle and in the corners of 1-lb. boxes showed a smooth curve from 70 deg. to −33 deg. F, indicating no definite "freezing point." He found that tempering frozen candies at 40 F. to prevent condensation was unnecessary if 1-lb. boxes were overwrapped with vapor-proof material and allowed to remain unopened at room temperature for 2 hr. or longer.

It was also found that no serious effects on appearance or other change resulted when the candy was allowed to warm up to 70 deg. for 6 hr. and then was re-frozen at 0 F.

The same investigator learned that butterscotch candies could be held in excellent condition for 241 days

* Unpublished data by R. N. Mantey, commercial air conditioning engineer, Dayton, Ohio.

at 0 F., while those containing nuts were good for more than 6 months without appreciable deterioration.

Standard Coconut Squares

Very difficult to keep fresh are the coconut candies. Within a few weeks at room temperature they turn yellow and develop a "soapy" flavor.

A test storing of coconut squares (18-lb. blocks of hard creams and shredded coconut in different colors and flavors with a sugar coating) was conducted for a 10 months' period at three temperatures.

At 0 F. the color, finish, aroma, and structure were retained in almost perfect condition, even though there was a noticeable loss in flavor. And when stored at temperatures above 0 F., the flavor gradually became stale and less pronounced.

Held at 32 F., candies scored higher on all of the qualities (except structure) were lower than when stored at 0 F., while in samples kept at 50 F., the finish, aroma, and flavor were so poor that the candy was no longer considered salable.

The total sensory scores on the coconut squares stored here at 0, 32, and 50 F. were 90.2, 85.2, and 70.4%, respectively. Similar results were obtained when nougat bars, French creams, and caramels were stored at the three given temperatures for 10 months.

Color of chocolate coating did not influence cracking due to freezing. This was shown by freeze tests on 187 varieties of chocolate coated candies. Of 60 which cracked, the coating was dark chocolate on 25 and milk or light colored chocolate on 35. Of 127 varieties that didn't crack, 72 were dark and 55 light.

Checking the Points

Finally a summary to accent the findings: Freezing not only retarded rancidity and eliminated staling, but also preserved the original texture and appearance in most of the candies investigated. Candies containing butter creams, coconut, and nuts were kept successfully for 1 yr., and those made of chocolate for 2 to 3 yr., while nonfat and hard candies were held for much longer periods.

All candies held at 0 F. or lower became hard and brittle. But with few exceptions they regained their original characteristics when returned to room temperature in unopened packages.

Though on the one hand, a few candies—spun candy chips, chocolate covered nuts, and others with hard centers—cracked or split during freez-

(*Turn to page 225*)

TABLE 1—FREEZING AT —10 F. Did Not Affect Structure of These Candies When Proper Warming Followed

Almond Butter Toffee, Brittle (coconut, peanut, pecan), Candy Corn, Chewy Caramel Blocks (cellowrapped), Grained Caramel Blocks (cellowrapped).

Cherry Cordial Items: Light Chocolate-Coated Easter Eggs (foil wrapped), Vanilla-Coated Easter Eggs (foil wrapped).

Chocolate-Coated Items: Almonds, Almonds (foil cups), Butter Almond Toffee, Butter Cream Pecans, Cashew Nuts, Cherry Fruit Creams, Coconut Creams, Coconut Creams (coconut royal), Coconut Parfait, Coconut Pineapple Royal, Cordial Kumquats, Cordial Pineapple, Cordial Raisins, Dixie Fruit Coconut, Filberts 2's, Filberts in Caramel, Honey Nut & Fruit, Marshmallow & Pecans, Nougat, Nougat Caramel Bars, Nut & Fruit Fudge, Orange Cream Butterscotch, Orange Marmalade, Orange-Pineapple Creams, Peanut Roll With Nougat Center, Pecans, Pecan Pequins, Pineapple-Coconut Creams, Pineapple-Coconut Royal, Pineapple-Fruit Creams, Pineapple Pecan Conserve, Pudding Creams, Thin Mints, Vanilla Butterscotch, Vanilla Brazils, Vanilla Creams.

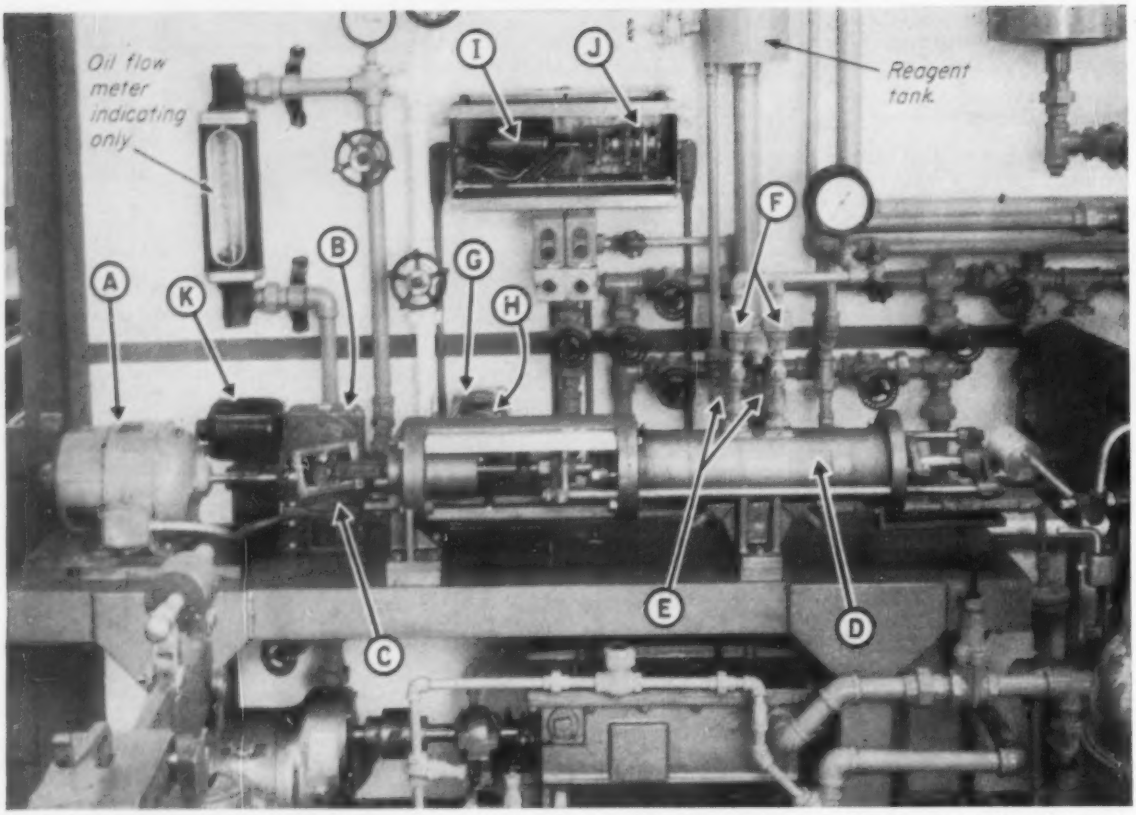
Others: Chocolate Fudge With Walnuts (foil-wrapped), Crystallized Hard French Creams, Glazed Brazil Nuts (pecans, walnuts), Hard Candies (all kinds except spun honeycomb chips, nuts and fruits, cherry nougat, nougat blocks) (cellowrapped), Panned Candies (most kinds), Peanut Butter Spun Bar With Butter Cream, Spiced Brazil Nuts (pecans, walnuts), Spun Candies (most flavors except honeycomb chips), White French Nougats.

TABLE II—QUALITY OF COCONUT SQUARES Stored at Temperatures of 0, 32, and 50 F. for 10 Months

Storage Temperature (Deg. F.)	Score					
	Color (20)	Finish (10)	Aroma (20)	Flavor (30)	Structure (20)	Total (100)
0	18.4	9.4	18.0	26.4	18.0	90.2
32	17.2	7.8	16.4	25.8	18.0	85.2
50	14.8	5.8	13.2	19.8	16.8	70.4

TABLE III—EFFECT OF —10 F. FREEZING of Candies Compared With —170 F. Dry Ice Freezing

Candy Items	Condition of Thawed Candies After Freezing at:	
	—10 F.	—170 F.
Almond Butter Toffee	No change	No change
Almond Toffee	No change	No change
Brazil Caramel (slightly tough)	Freshened, softer, mellowed	Same as at —10 F.
Butter Bon-Bons	Freshened	Same as at —10 F.
Butterscotch Jellies (slightly crusty)	Freshened, mellowed, less crusty	Same as at —10 F.
Caramels (cellowrapped)	No change	No change
Caramel, chocolate almond (slightly hard)	Freshened, softer	Same as at —10 F.
Caramel Covered Coconut (slightly dry)	Freshened, softer, more moist	Same as at —10 F.
Caramel Covered English Toffee	Freshened, mellowed	Same as at —10 F.
Caramel Covered English Toffee, chocolate coated (slightly tough)	Freshened, softer, more tender	Same as at —10 F.
Caramel Nougats (slightly dry)	Freshened, softer, mellowed	Same as at —10 F.
Caramel Opera Creams (slightly tough)	Freshened, more tender	Same as at —10 F.
Chocolate Coated Almonds	No change	No change
Chocolate Coated Coconut Center With Almond	No change	No change
Chocolate Coated Nougat, (peanuts, caramel)	No change	No change
Chocolate Fudge With Walnuts (foil-wrapped)	No change	No change
Creamed Almonds (very hard, brittle)	Mellowed, softer	Same as at —10 F.
Filbert Truffles (slightly tough)	Freshened, softer, more tender	Same as at —10 F.
Fruit flavored Jellies (slightly crusty)	Freshened, softer	Same as at —10 F.
Hard Cream, Fruit Centers	Freshened	Same as at —10 F.
Jelly Bars (quite dry, crusty surface)	No change	Freshened, softer, more moist
Jelly Marsh (slightly hard)	Freshened, softer, more mellow	Freshened
Nougat, chewy, nut & fruit	No change	No change
Pecan Nut Rolls, fruit center (cellowrapped)	No change	No change
Peanut Butter Spun Bar (butter cream)	No change	No change
Peanut Butter Spun Bar (hard cream)	No change	No change
Peanut Butter Spun Bar (chocolate coated)	No change	Slightly gummy
Peanut Butter Spun Bar (dark-chocolate coated)	No change	No change
Spun Candy Chips:		
Molasses (coarse holes, dark-chocolate coated)	No change	No change
Molasses (fairly coarse holes, dark-chocolate coated)	Few cracked on inside	Cracked throughout, shattered
Molasses (very fine holes, dark-chocolate coated)	Cracked throughout, shattered	Cracked throughout, shattered
Molasses (fairly coarse holes)	Few cracked on inside	Cracked throughout, shattered
Peppermint (fairly coarse holes, milk-chocolate coated)	Few cracked on inside	Cracked throughout, shattered
Peppermint (very fine holes, dark-chocolate coated)	Cracked throughout, shattered	Cracked throughout, shattered
Uncoated Spun Chips (fine holes)	Slightly grainy and cracked	Slightly grainy and cracked
Toffee Drops	No change	No change



COMPONENTS of "Ratiometer": DC pump-motor (A), speed reducer (B), stroke adjustment mechanism (C), and cylinder proportioning (metering) pump (D). Pump's suction check valves are at (E), and discharge valves at (F). Integrated flow meter (G) drives synchro selsyn (H). Acting through differential selsyn (I) and rheostat (J), selsyn (H) regulates speed of a third selsyn (K) to control speed of pump motor (A).

Proportioning Paces Oil Process

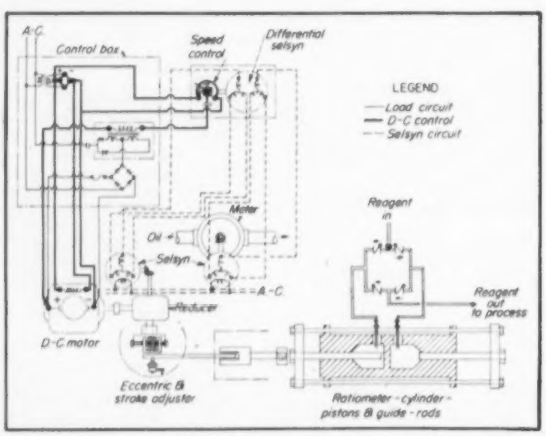
Engineered to meet unique requirements, new device is precise, yet rugged. It can be adjusted while operating

Something "special" in continuous, automatic proportioning is a vital requirement of the new tank-car-a-day plant built to research edible oil refining by Sharples Corp., Philadelphia.

So the company's engineers came up with a proportioning system which meets these stringent requirements:

1. **Design rugged and operation simple.**
2. **Extreme accuracy in delivery.**
3. **Complete dependability.**

For details of oil process in which proportioner plays vital part, see Picture Flowsheet, p. 118-121.



WIRING DIAGRAM of Ratiometer synchro selsyn motor control.

4. **In-operation adjustment for volume.**
5. **Maintenance needs minimum and can be handled by untrained personnel.**

Of these qualifications, simple operation and ease of maintenance are of prime importance. This is particularly true since the device is designed for all types of processes requiring proportioning, even in very remote areas.

The new Ratiometer will be incorporated in all of the future vegetable-oil refining plants built by the com-

(*Turn to page 206*)

Ole Sage Episode

Emergency Call-In Pay

Give It? Fight It? Or *Avoid* It?

IVAN C. MILLER
Associate Editor, "Food Engineering"

Ole Sage, labor relations advisor, and Boss Ed Strong were about to leave the plant super's office at Zenith Canning Co. to attend a routine dinner conference.

Just then, Foreman Mike Brittle burst in. "Afraid I wouldn't catch you before you left," he said, rather breathless. Then he led them back into the canned bean department.

"Take a look: That retort-hoist motor burned out just now as the day shift ended. . . . I sent the night shift home. . . . Can we get a new motor or a new hoist in time for tomorrow's day shift? . . . Simply got to run out those beans in the soaking tanks before they're spoiled!"

"Mighty bad break," snapped Ed. "When was the last time this hoist was overhauled or repaired?"

"Before we started last Spring. But it wasn't in too good shape then—gears worn, bearings going. And it's been acting up a lot lately."

"You mean there were no repairs or maintenance after the fresh season was over?" asked Ed.

Mike spread his hands, palms up. "Two shifts most of the time this year, and for a short while three. Only got one line that can run on these off-season Winter products. Beans and more beans—pea beans, kidney beans, lima beans—twice as many cases as last year. Company ought to put in another line. No time for maintenance or repairs."

Brittle followed them back to the office and sank into a chair.

"Why not a maintenance and repair job after the second shift?" questions Ed. Brittle explained that so far he never paid overtime price for special repair crews. Not him—and he didn't intend to begin.

At this, Ed queried as to whether the overtime cost would have been as much as the call-in-pay for the crew that had just been sent home.

Brittle jumped up, banged his fist on the desk. "Not a penny for call-in pay. Covered in our union contract—air tight—and I know it by heart."

"Can we get a new motor or a new hoist in time for tomorrow's day shift?"

Ed squinted his eyes, then he drew a copy of the contract from his desk, and read: "The agreement stipulates that, when work is unavailable at the time workers arrive on the job there shall be no call-in pay—provided that the work is unavailable 'because of an emergency beyond the control of the company, or an act of God.'"

"Exactly" exclaimed Brittle, "It's according to the contract—we don't pay."

Ed now turned to Sage. "Ole, what's your opinion?" And after a moment's thought, Ole commented:

"Most bargaining agreements in the food industry have clauses guaranteeing call-in pay to employees who report for work and find none available. And usually, such clauses include a waiver—as your does—absolving management of obligations for call-in pay when work is unavailable due to an 'act of God' or 'conditions beyond the control of the company'.

"But in this case, if it should come to a legal showdown, I believe you'll have to pay. And I'd say that both from a moral and self-interest standpoints, it's really best that you shun the quibbling and pay."

Didn't See It That Way

But Zenith did not agree with Ole. Instead, it backed the foreman, and the case went to arbitration.

Then, not long after the settlement was reached, Superintendent Ed handed a sheaf of papers to Ole Sage. "Here's what the arbitrator decided," he said.

Ole then thumbed through the sheets, reading—

"The purpose behind a contract provision for a designated amount of 'report' pay for employees who, having reported for work as usual, but are sent home without having been put to work, is to stimulate the employer to protect his employees from fruitless inconvenience, and to compensate them if they are subjected to useless journeys between home and plant.

Meet Ole Sage . . .

Up the hard way came Ole, our principal character in this special series of "cases," fictionized to pinpoint boss-worker problems in the 1953 food plant.

Ole began as a laborer, proved himself "a good worker" who "used his head"—thus won the respect of both workers and bosses. He later rose to foreman, then superintendent. And finally he was management's choice as "a natural" to head Industrial Relations, a job he carried out with unusual success until his retirement.

—Actually, his was a very short retirement. Because his old company, and others, too, quickly were calling on him for counsel—as related in these episodes.—*The Editors*

"The contract in the instant case contains a provision which nullifies the employee's right to report pay 'in the event of an emergency beyond the control of a company, or acts of God.' This provision, when applicable, imposes upon the employee the entire burden of an inconvenience for which he is not accountable and which would otherwise be imposed, at least in part, upon the employer.

"The contract does not define 'emergency beyond the control of the company', but since this phrase is coupled with 'acts of God' it is apparent that the parties had in mind events of a catastrophic nature against which the employer could not guard by reasonable forethought and precautions.

"If the company had acquired some new machine, and if, after being in operation only a few hours it were to break down shortly before the commencement of a shift, this would be an emergency beyond the control of the company disentitling the employees assigned to the machine to 'report pay'.

"But, if an old machine were to give out because the company had consistently been using a cheaper grade of lubricant than that recommended by the manufacturer, this would not be an emergency beyond the control of the company. For the exemption to be operative, the event must be not only an 'emergency', but also 'beyond the control of the company.'

"The instant problem does not center upon the term 'emergency'; realistically viewed, every breakdown presents an emergency. The difficulty lies in determining what the parties meant by the phrase 'beyond the control of the company.'"

"In this particular case, the testimony indicates that the company kept the retort hoist practically in continuous 'round-the-clock operation for a period of months immediately preceding the breakdown. There was no evidence of periodic general examination and overhaul.

"If the demands of an employer's business induce him to run a given machine constantly without checkup or replacement of major parts, that is his privilege, but when the machine breaks down under this strain he is not warranted in shifting part of the cost of this deliberate policy upon his employees by denominating the breakdown as an emergency beyond his control. He has taken a calculated and probably a warranted risk with the machine, but it is his risk and not that of his employees, and they should not be deprived thereby of 'report' pay."

Lesson Learned

Ole looked up from the papers. "You know, Ed, that night the retort hoist broke down I tried to give it as straight a look as I could. To me the situation called for a quick solution—that is, the pay due. And I say 'due' because morally it was. We see, now, that it would have been a small price in comparison."

He continued: "The company—at the top—never seems willingly to concede to the union, no matter what the issue. In figuring costs, it doesn't seem to be using the same kind of pencils."

Ed Strong shook his head. "Yes, and most of the workers on the bean canning lines—both shifts—are sore at Brittle and at the company, too. And that no doubt includes me. Also production is down. Anyhow, I sure hope the ill-will of these regular employees doesn't spread to the seasonal workers."

"Of course," summarized Ole, "all of this trouble could have been avoided by repairs in time. Many years of experience have convinced me of two things: First, there's a special similarity to draw between men and machines—that is, if you treat them right they seldom get out of order. The other point is that trouble with machines can be righted much easier than trouble with people—and at far less cost."

Editor's Note: The settlement quoted in this episode is taken from an actual, parallel case that was weighed under rules of the American Arbitration Assn., with Alexander H. Frey, professor of law, University of Pennsylvania Law School, as arbitrator.

Particularly, readers should not infer that other arbitrators would reach the same decisions in apparently similar cases, since circumstances differ widely, thus altering the factors. Rather than being based on precedent, decisions derived from case history, points of the specific contract, and pertinent evidence.

From Ole's Notebook

How Your Expansions "Prosper" the Town

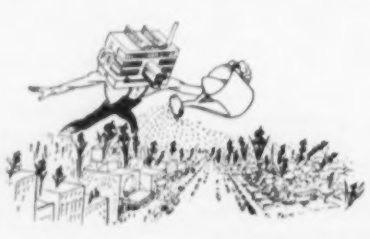
When your company opens a new factory, or expands personnel in your present plant, the influence of your activity on the local community is considerable. And just *how* considerable now can be roughly estimated.

Basis for the gage now developed is a special study over 10 yr. by the U. S. Chamber of Commerce, specially aimed to measure the impact of new industry on local business.

The investigation explored the question in nine different communities—Colberg, Ala.; Hot Springs, Ark.; Habersham, Ga.; Calcasieu, La.; Lee, N. C.; Jefferson, Pa.; Oconee, S. C.; Hamblen, Tenn.; and Giles, Va. And here are the findings—

■ **Every 100 new industrial workers will increase local retail sales by $360,000, personal income by $519,000, and bank deposits by $270,000. Further, 74 new jobs will be created in other lines of work, 112 more households will be established, and population will increase by 296.**

Also, the industrial role you created will add, per every 100 plant workers, four new retail establishments, 107 car registrations, 38 truck and bus registrations, and 70 new residence telephones. Finally, your company's addition of 100 employees averages out as creating 174 new jobs, while ending some old ones. Here's the story—



Retail trade	+33
Construction	+25
Professional, related services	+14
Transportation, communication, other public utilities	+13
Business and repair services	+5
Wholesale trade	+5
Public administration	+5
Finance, insurance, real estate	+4
Entertainment, recreation services	+2
Industry not reported	+2
Forestry, fisheries	+1

Personal services	−2
Mining	−2
Agriculture	−31
Total, all industries	+174

These contributions you thus make to the growth and prosperity of your community from pertinent facts you well may employ in your public relations programs.

The survey also indicated how adverse conditions, such as lost markets, fires or floods and other acts of God, or prolonged strikes, have reduced personnel and/or their effectiveness in the community—thus bringing reverse effects.

Boss-Boosted Safety

Frequency and severity of injuries run definitely higher in small plants than in larger units.

This situation is borne out by the National Safety Council, which shows rate-averages stand 2 to 5 times greater in minor-size organizations. And, in fact, rates have been gaged at 5 to 25 times higher in a specific survey made in Pennsylvania.

Of course, the smaller the plant the stronger the relative impact of the injuries. In such firms, less care appears to be taken in choosing workers and less effort is given to matters of training and employee-placement within the organization.

Then, too, the quality of supervision may be lower. Furthermore, expenditures of money and efforts on safety is proportionately less.

■ **Even so, management of the lesser units can make their operations just as accident-free as those of the larger units—and at no greater cost, since the major requirements are "management desire, management determination, and management effort."**

Work-Time Negotiations —At Whose Expense?

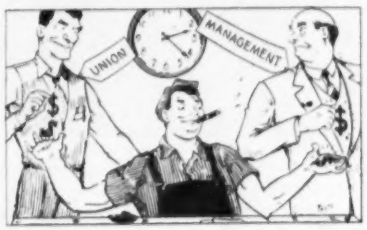
A 1954 study of 120 organizations made by the National Industrial Conference Board reveals that approximately half (57) of the companies pay employees on the negotiating committee of a union for the time spent negotiating during working hours.

And in more than a third of the cases, the union pays them for the same time.

In just 10% of the companies does management and labor split these costs involving working hours.

■ **Attitudes of different managements vary. Some think that recompensing union committeemen for negotiating time is like "paying someone to hit us over the head." Others happily pick up the ticket, because then it is possible to negotiate during regular business hours—an item of consequence to management members whose loaded work days preclude long nightly sessions.**

Companies that pay for negotiating time safeguard themselves mainly through unwritten agreements with



union leaders to protect themselves and prevent abuses.

As a result, no payment is made such workers except for working-hour sessions. Also, no payment is made to a union committeeman who is not actually on the company's payroll at the time.

To Curb Off-Job Mishaps

—has been one of the prime ideas of Gregg Meyer, Blatz Brewery safety and security engineer:

■ **To his way of thinking, any large corporation has an opportunity—as well as a responsibility—to give its employees safety guidance relative both to driving to and from work and also their personal motoring."**

And he did something about it—carried out a project with the management to help the workers avert one of the most common accident situations. In short, reflector-type highway signals (Vari-Flares) were made available to all employees. When set out on the road, by day or night, these devices warn approaching drivers of cars stalled just ahead.

Unemployment Benefits Need Looking At

It's laudable that employers provide unemployment insurance benefits for tiding over persons out of work and looking for new jobs.

But it's lamentable when a large portion of the benefits go to workers who quit voluntarily, or who by their own acts brought about their dismissals.

This situation has been spotlighted in a New York State survey by the Commerce & Industry Assn. of New York. And conditions in this state probably vary little from conditions nation-wide.

Checked here were 11,938 employees. For the year ending June 30, 1954, they received $2,993,806 in benefit payments, which were charged to 218 firms.

■ **Yet only 43.3% of the claimants were actually idled by lack of work, and this group received only 38.4% of the disbursements.**

It isn't that there "ought to be a law." There is one. But some rectification of such inequities is certainly in order.

Projection of the survey results provides this gage of state-wide disbursements:

Lack of work	$93,934,080
Pregnancy	1,369,872
Compulsory retirement	38,013,948
Voluntary retirement	3,424,680
Voluntary quits	39,873,060
Misconduct	19,080,360
Industrial controversy	489,240
Laid off with dismissal pay	22,015,800
Others	26,418,960

Recreation Programs —Yours or Workers'?

There are many reasons, says the National Industrial Relations Assn., why company recreation programs can fail.

Among them: Providing elaborate facilities where they're not needed,

trying to force the programs on employees, and general pushing of such activities without the prior establishment of worker support.

■ **True, such programs should be company generated. But to be successful they should be employee directed—not boss directed.**

Accident Repeaters Are Much Alike

Check up on your route drivers who've had a series of accidents—either damage to persons or property—and you'll likely find certain common denominators of the species that don't show up among your safe drivers.

A study of 1,400 route salesmen was conducted over a 3-yr. period, and as

(Turn to page 185)

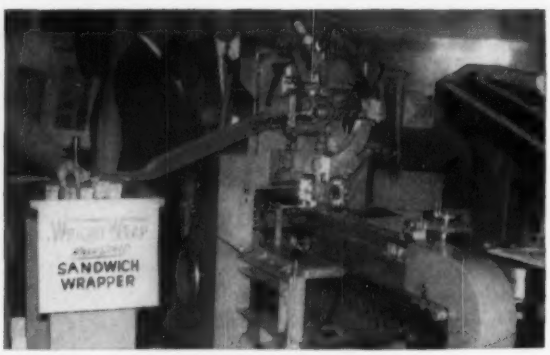
11 WRAPPERS

VERSATILE AUTOMATIC wrapping machine handles variety of food products, including cakes, candy bars, vegetables, and meats. The products may be in cartons, trays, U-boards, on flat cards, or without support. Almost any heat-sealing wrap may be used, and a die-cut label is applied. One person can operate the high-speed machine. Handwheel adjustment for package size is quick.—Oliver Machinery Co., Grand Rapids 2, Mich. (82A)

74 Ways To Speed Packaging

New, better and faster machines seen at Packaging Exposition for
Wrapping • Forming • Filling • Closing • Labeling • Cartoning • Casing

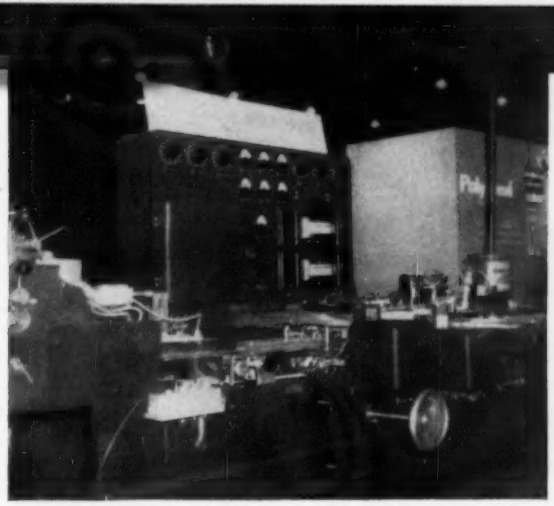
MULTI-PURPOSE machine makes and wraps up to 100 ice cream sandwiches per minute. Ice cream flows from freezer to extruder. A wafer from each side of extruder moves with ice cream into indexing wheels that shear the sandwich. Sandwich is then wrapped and sealed.—Lynch Corp., Anderson, Ind. (82B)



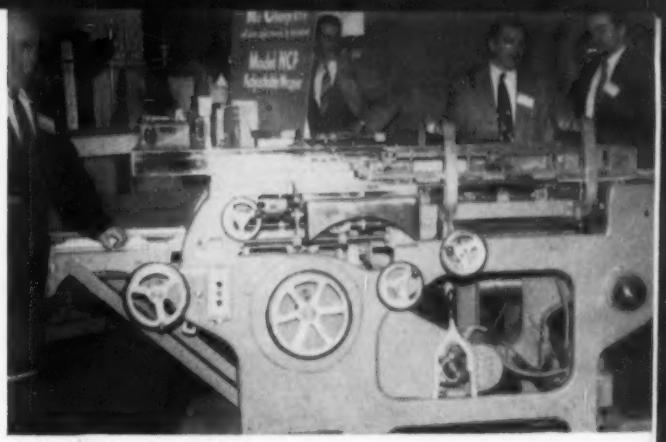
SANDWICH WRAPPER puts cellophane from roll around cracker sandwich, seals package in conjunction with fold, and applies label at 120 per min. Plunger pushes product into cellophane, through fold box, and into mold wheel. Then seal is applied.—Wright Machinery Co., Durham, N. C. (82C)

LETTUCE WRAPPER automatically draws film around product and heat-seals it over butt area at 30 to 65 per min. Makes full-view conforming wrap and uses photoelectrically registered printed film from roll to permit brand identification. Also perforates film for ventilation. Has conveyor feed. Is size-adjustable in 10 min.—Wrap-King Corp., Holyoke, Mass. (82D)

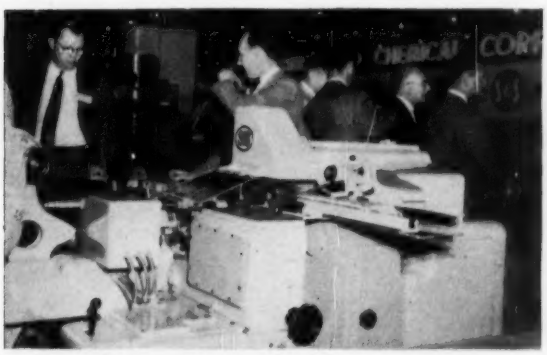
AUTOMATIC BUNDLING machine has been designed and constructed for fast, smooth operation. Moving parts rotate, rather than reciprocate—for quiet, speedy, low-stress performance. Machine is adjustable to different sizes. Has new printing attachment, and uses either paper or cellophane. There is a choice of collating units.—Scandia Mfg. Co., North Arlington, N. J. (82E)



STRAIGHT-THROUGH wrapper vacuum-seals regular and irregular shaped meat cuts, loaves, bacon, patties, and other foods. Requires no trays, stiffeners, large **overwraps, or double wraps.** Simple adjustments for **change-over.** Positions label design of pre-printed wrap. **—Hudson-Sharp Machine Co.,** Green Bay, Wis. (83A)

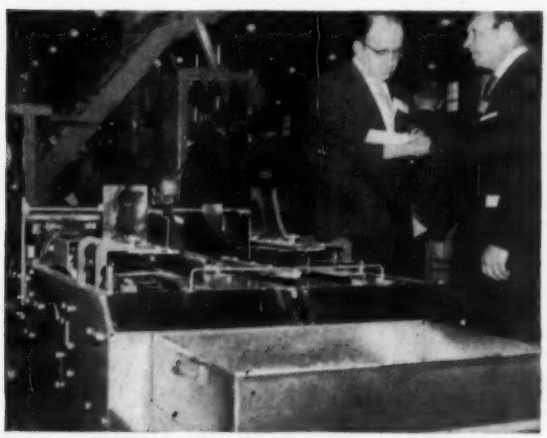


NO CHANGE PARTS or tools are needed to adapt this wrapper to different sizes. Adjustments are by hand-wheel. Ranges are: length, 5 to 12 in.; width, 2⅞ to 7¼ in.; height, ⅝ to 3½ in. Speed is up to 80 per min. Has new "exact fractional" paper-measuring device. —National Equipment Corp., New York. (83B)

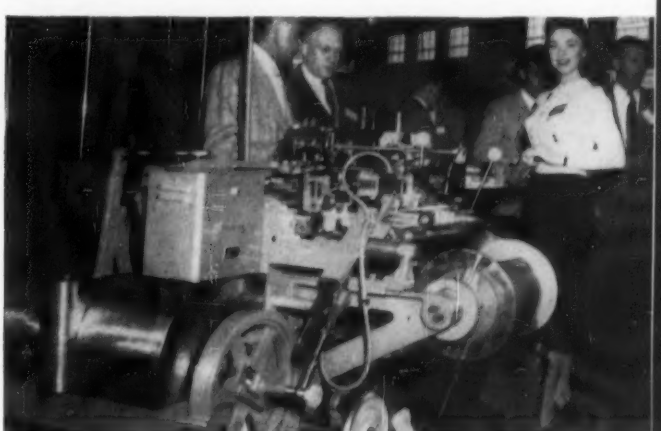


120 CHOCOLATE BARS per min. are wrapped by this precision-built Swiss machine. Change-over to another size achieved with hand-wheel and adjustment scale. On-and-off switch with slow-motion position prevents unintended operation. Many adjustments without tools. —Stokes & Smith Co., Philadelphia. (83C)

UP TO 160 per min. is the speed of this multi-purpose wrapping machine. It handles ice cream bars from ¾x7/32x2⅜ in. to 2-5/32x9/16x6⅛ in. Featured is discharge of wrapped products from machine on a horizontal-on-edge exit trough. Working parts accessible and protected.—Supermatic Packaging Corp., Newark, N. J. (83D)



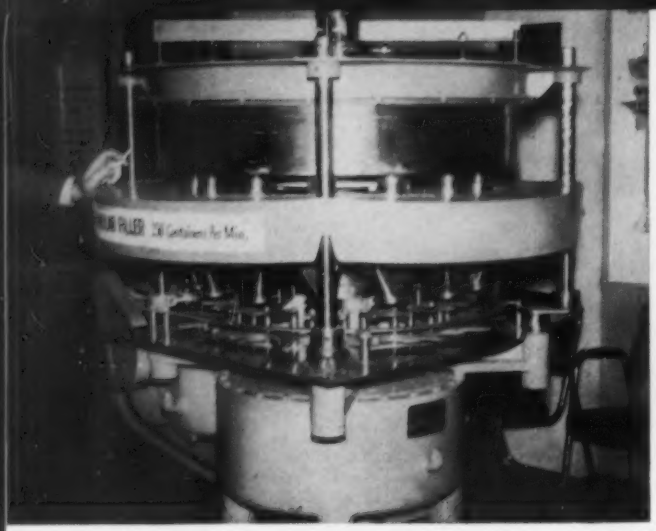
PORTABLE, semi-automatic machine wraps up to 25 roasts or poultry per min. Operator makes first fold of wrapper around tray-packed product, slides over heat-sealing bar and feeds to conveyor. Machine's mechanical grippers tightly pull wrapper around meat for final sealing.—Package Machinery Co., Springfield, Mass. (83E)



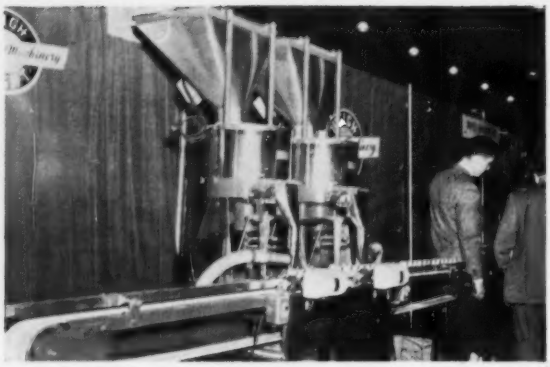
COMPACT wrapping machine will handle up to 50 items for pre-packaging per minute. Advanced unit features an overhead finished package ejector with a bottom heat-sealing plate to assure sealing. Short (8-in.) stroke of pusher bar provides high-speed wrapping.—Hayssen Mfg. Co., Sheboygan, Wis. (83F)

Turn page for more units →

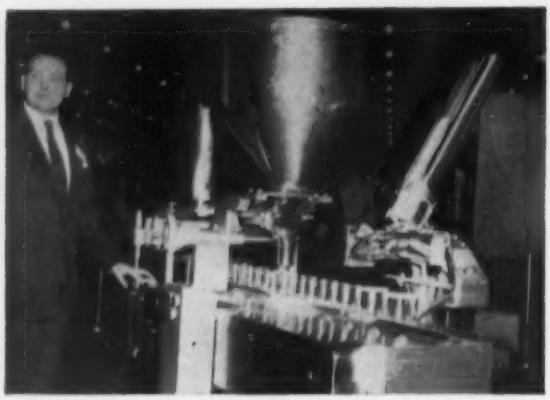
14 FILLERS



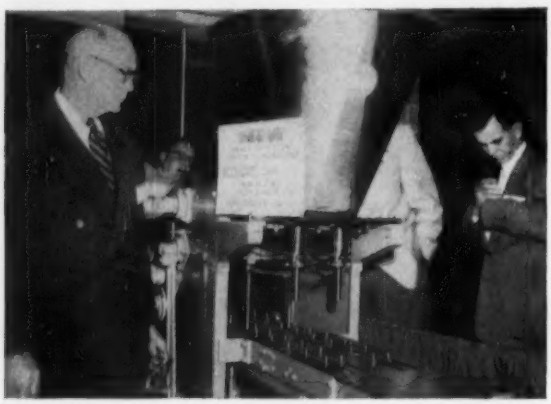
250 PER MIN. is speed at which dry products are filled into rigid containers—round or rectangular, and up to 1-lb.—by this rotary unit. Dust is removed by vacuum system, and reclaimed. Machine is of vulumetric, pocket type, adjustable to different fills.—Pfaudler Co., Rochester 3, N. Y. (84A)



DUAL-HEAD UNIT fills ⅛ to 16 oz. of free-flowing material into cans, cartons, or bottles at 75 to 120 per min. Each filler is equipped with dust-collector tube and can be independently operated. Tandem fillers also fill 99% at first spout or 50% at each.—Weigh Right Automatic Scale Co., Joliet, Ill. (84B)



STRAIGHT-LINE machine fills salads and similar products into cups that are coded and capped at 35 per min. Easily converted into twin-line unit.—Triangle Package Machinery Co., Chicago. (84C)

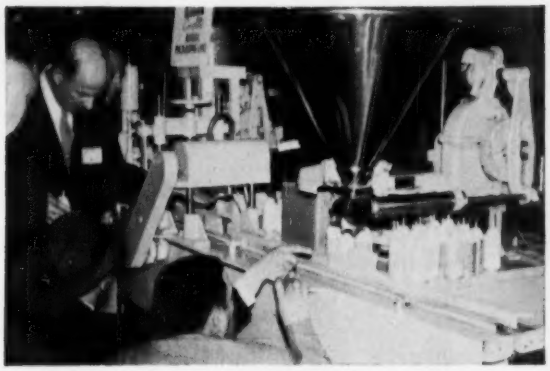


2-PISTON volumetric unit fills viscous or semi-liquid products into jars at 50 per min. Has no-container, no-feed device, as well as adjustable stainless steel hopper. —Hope Machine Co., Philadelphia. (84D)

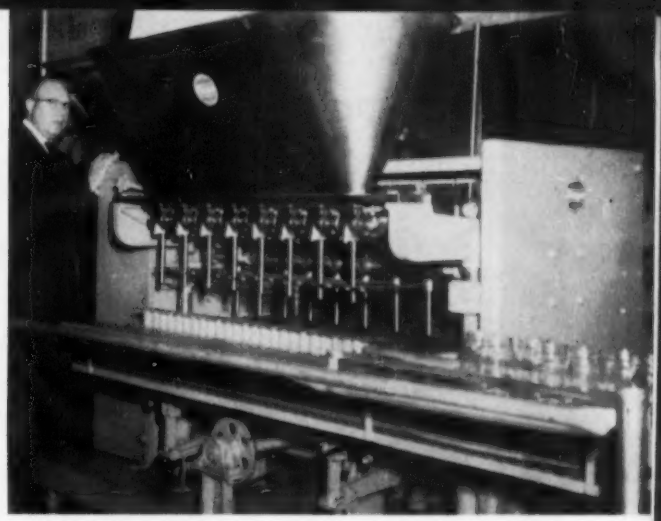
VERSATILE filling machine is suited to small or large plants. It can be used for short runs, odd size containers, and a variety of packages from ⅛ oz. to 5 lb.—Stokes & Smith Co., Philadelphia. (84E)

TWO COMBINATION machines weigh-fill free or semi-free flowing materials (8 oz. to 25 lb.) into any type container. Weight change takes about 3 min. Machines weigh within ¼ oz. Speeds are up to 25 packages per min. Conveyor discharge of weighed material may be automatic or controlled by operator. Product change-over easy. Left: Automatic (84F), Right: Manually operated (84G).—Trescott Co., Inc., Fairport, N. Y.

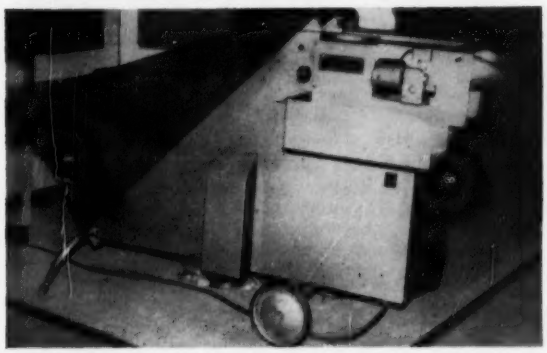
New 250-per-min. dry products unit typifies speed trend



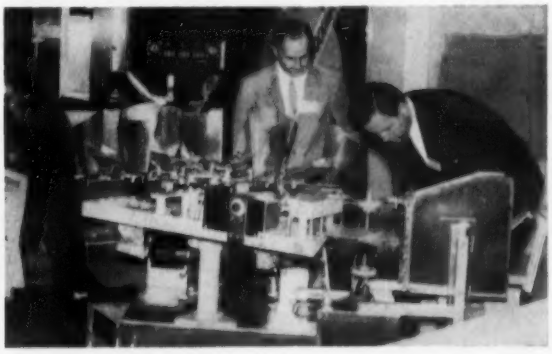
AERSOL PACKAGER does the complete job, at 25-30 per min. Cans are filled by volumetric piston. Then machine draws vacuum, crimps closure, and injects gas. Machine is of sanitary design, with stainless steel product-contact parts, and is compact unit.—Elgin Manufacturing Co., Elgin, Ill. (85A)



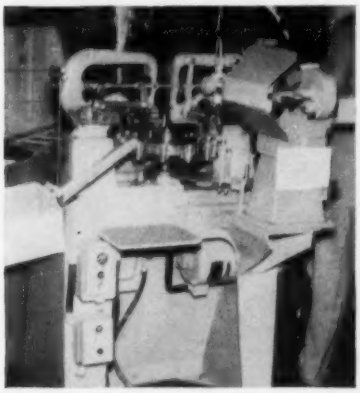
HEAVY-DUTY, 8-piston volumetric machine fills viscous products like jellies, mayonnaise, and peanut butter into glass containers at speeds up to 160 per min. Featured are new straight-line jar-pusher bar, adjustable hopper height, and adjustable elevating table for containers.—Hope Machine Co., Philadelphia. (85B)



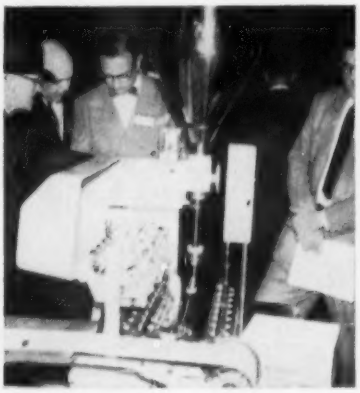
WEIGH-BAGGER conveys potatoes across weight platter to spout. Then feed stops at correct weight. Operator puts bag in place and depresses spout to fill it. As spout is released, cycle repeats. Unit handles 1 to 10 lb. Weight change is made in 30 sec.—Exact Weight Scale Co., Columbus, Ohio. (85C)



NO HANDS needed with this machine to package semi-free-flowing dry products into heat-sealed bags. Two scale hoppers speed operation. Bags are picked up, opened, filled and heat-sealed. Weight range is 2 to 16 oz. Low- or high-level feeder available.—Woodman Co., Inc., Decatur, Ga. (85D)



LOW-PRICED filler operates automatically at 40 per min. with liquids, semi-automatically at 20 to 30 per min. with pastes. Latter are filled without air entrapment. Fill (6 fl. oz. max.) is by metering pump.—Arthur Colton Co., Detroit 7. (85E)

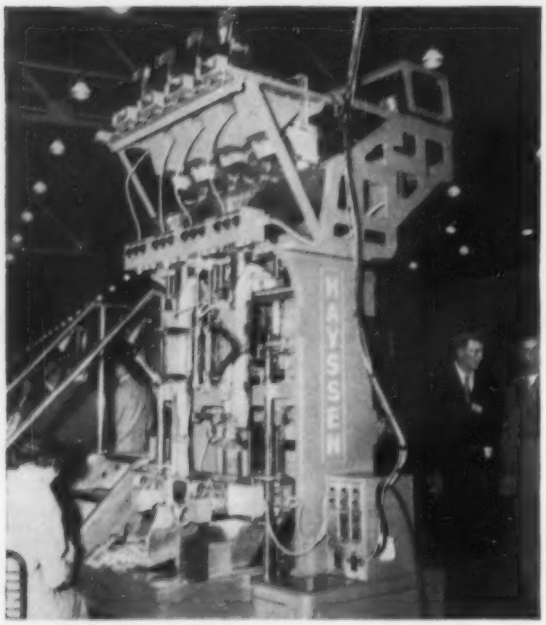


FOOD IN TUBES of collapsible metal is packaged at 55 per min. by this unit. Products from water-thin to very heavy are precision filled (max., 8 oz.) by metering pump. Size changed in 15 min.—Arenco Machine Co., Inc., New York 18. (85F)

FAST HAND FILLER for cottage cheese handles 4-oz. to 1-lb. containers at 30-40 per min. Gravity piston draws in product above it, forces out that below it, is turned 180 deg. to repeat operation.—Anderson Bros. Mfg. Co., Rockford, Ill. (85G)

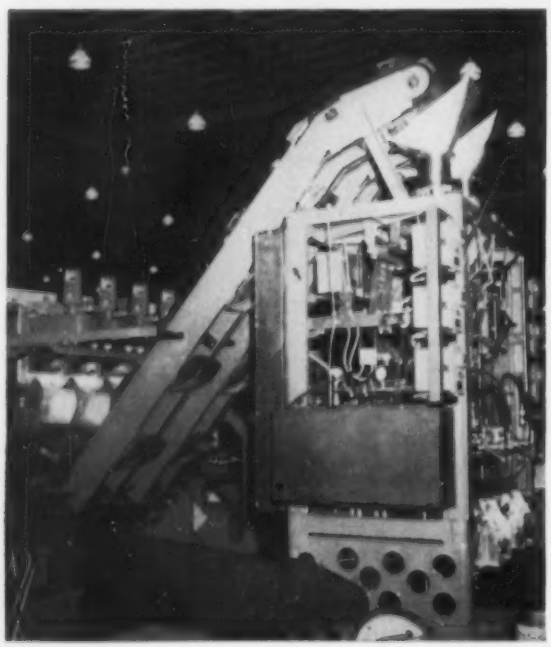
Turn page for more units →

4 UNITS FORM, FILL, AND SEAL BAGS

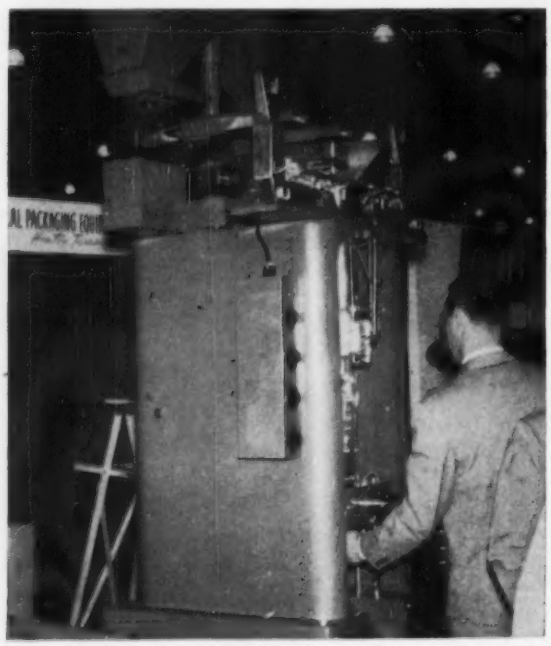


ADVANCED UNIT that forms, fills, and seals bags up to 150 per min. is low-frame machine with 4 filling and sealing mandrels. Has bulk and dribble feeds for 1/32-oz. accuracy, and special electronic sealing control. Available for scale, auger, pump, or volumetric feeding.—Hayssen Mfg. Co., Sheboygan, Wis. (86A)

PILLOW-PACKAGE forming, filling, and sealing machine of dual type and simplified design operates at 160 per min. It has four heat-sealing heads for fast action. Register is controlled by photoelectrically actuated brake. Has crank adjustment of vertical stroke.—Counsel Machine Co., Inc., Wallington, N. J. (86B)



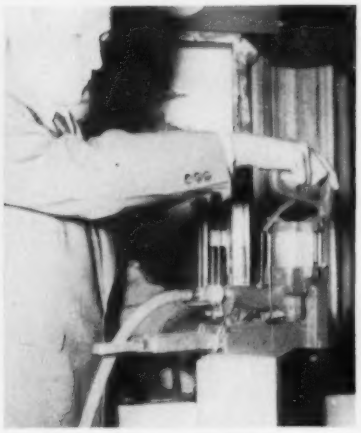
TRANSWRAP machine has latest net-weight scale feeder. Product is hopper-delivered through adjustable feed gate. Gravity and vibration carries it to counterbalanced gate and feeder channels. Main feed is to scale-suspended, rotary weigh buckets. Dribble feed follows to make up exact weight.—Package Machinery Co., Springfield, Mass. (86C)



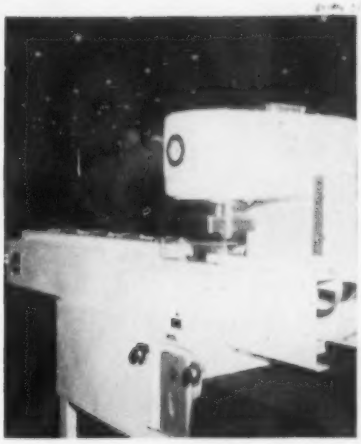
BAGS 3 TO 12 IN. LONG, of pillow type, are formed, filled, and sealed automatically on this machine. And size adjustment is made in one quick operation. Speed can be changed while unit is operating to vary bags per min. Feed is alternate from two accurate-fill scaling units atop the machine. Package material is taken from roll.—General Packaging Equip. Co., Houston, Tex. (86D)

7 CLOSERS SERVE VARIOUS PURPOSES

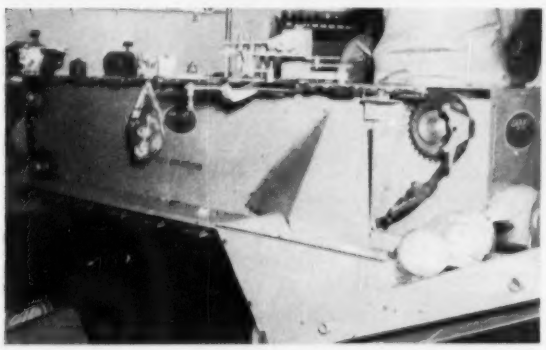
HIGH-SPEED stapler is electromagnetically operated. Compact, portable unit operates quietly. Available with foot or fingertip control. Equipped with interchangeable office staplers.—Air-E-O Electronics Corp., Milwaukee. (87A)



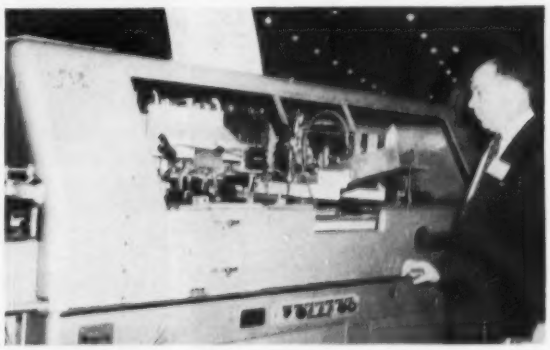
AIR-OPERATED portable stapler eliminates manual cycle control, possibility of partial cycle or repeating, and spring return. Lightweight unit operates on 50 psi. Depth of penetration regulated.—International Staplers, Herrin, Ill. (87B)



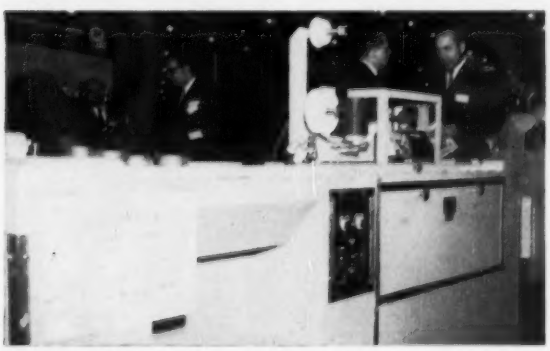
SPECIALLY DESIGNED machine automatically closes Ekco-Foil vertical flange containers at 25 per min. speed. The filled containers, with their covers in place, are conveyed to die, where closure is made.—Ekco Products Co., Chicago. (87C)



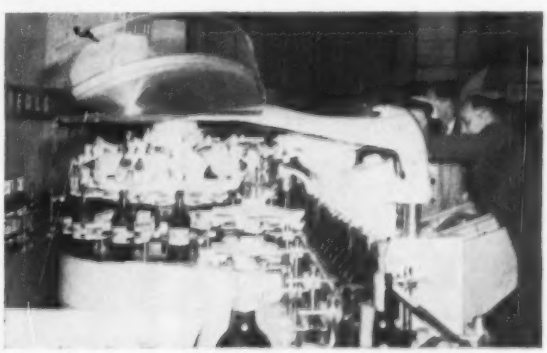
AUTOMATIC closer tape-seals up to 120 bags of prepackaged produce per minute. Safety cut-off stops machine in event of improper fill. Pressure-sensitive tapes from two rolls are measured and are applied face-to-face to form moisture-proof closure.—J. H. Platt & Son, Los Angeles. (87D)



SEMI-AUTOMATIC machine receives filled bags from conveyor, tucks gusset, applies header or label (plain or thermoplastic), and heat-seals bag and label at speeds up to 70 per min. Speedily adjustable to handle bags 1¼x2x6 to 2⅔x5¼x12 in.—Peters Machinery Co., Chicago. (87E)

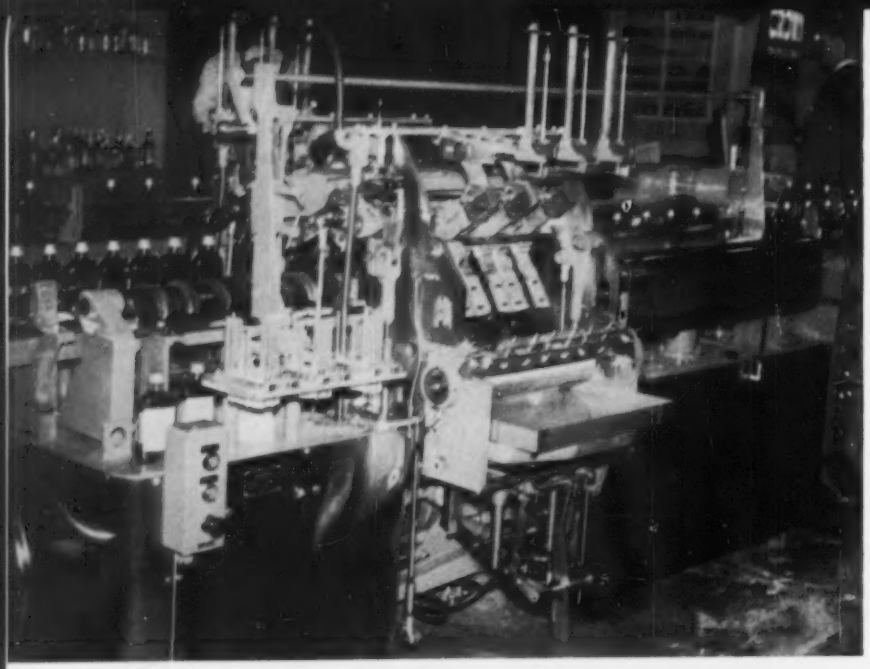


SEALING MACHINE applies roll-fed pressure-sensitive tape over perforated, sprinkle-type metal container lids at a 65 per min. rate. Photoelectric eye registers printed information.—Dellenbarger Machine Co., N. Y. C. (87F)



PRECISION-BUILT unit applies pre-cut cellulose bands to bottles at 150-per-min. Versatile continuous machine has simple controls, safety features, and quick change-over.—Gisholt Machine Co., Madison, Wis. (87G)

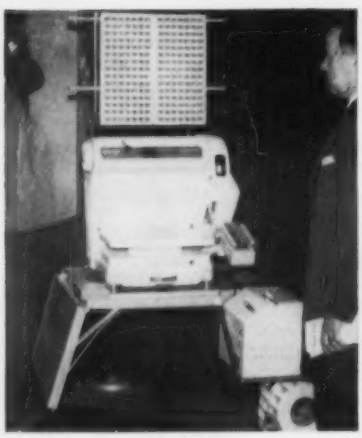
Turn page for more units →



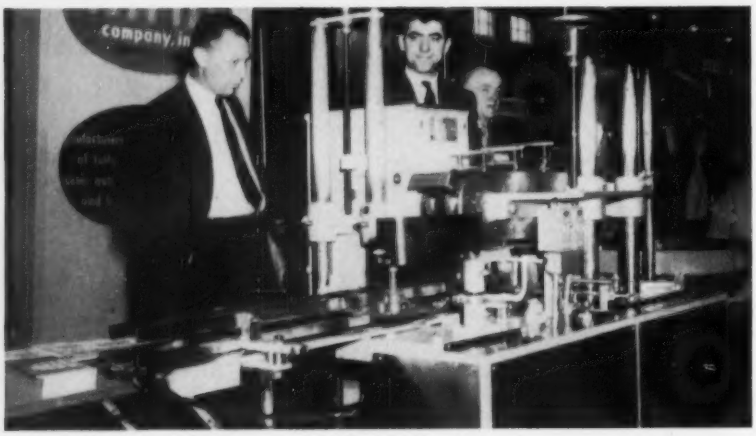
5 LABELERS

Revolutionary 3-in-1 unit sets pace at 300 per min.

THREE-IN-ONE LABELER will apply front, back and shoulder labels to glass bottles; or front, back and wrap-around neck labels or foil—all at the same time and at a rate up to 300 containers per min. Labels or glue can be added while machine runs. Air-operated pressure wipers affix labels firmly. Straight-line unit has "no-bottle, no-label" control. It slows down when flow of bottles is interrupted; stops for oversize containers or pile-up at caser.—Economic Machinery Co., Worcester, Mass. (88A)

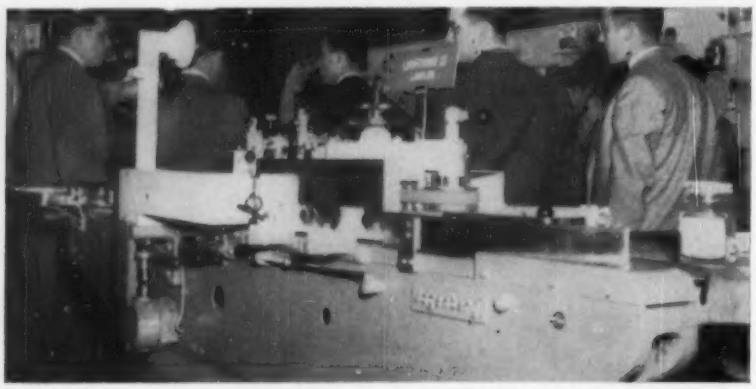


VALUE IS PRINTED on colorful label—with weight, price, date, and product—by prepackaging scale. Operator punches keys for value.—Toledo Scale Co., Toledo 1. (88B)

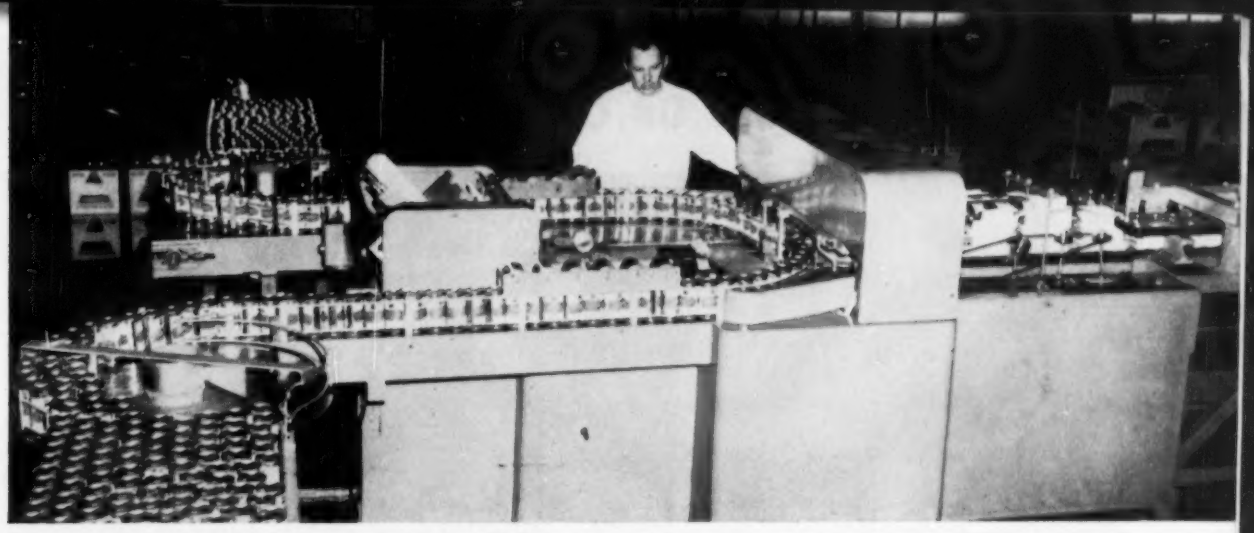


VERSATILE LABELER permits handling all sizes and shapes of labels (glue or thermoplastic) on any container surface. Features handwheel adjustments for container heights and label registration, reducing down-time for change-overs. Advanced gluing technique assures clean, ooze-free label.—MRM Co., Inc., Brooklyn, N. Y. (88C)

FAST IMPRINTER cuts inventory of cartons, bags, tags by printing product sizes, etc. on them as needed, up to 10,000 pieces per hr.—Pitney-Bowes, Inc., Stamford, Conn. (88D)



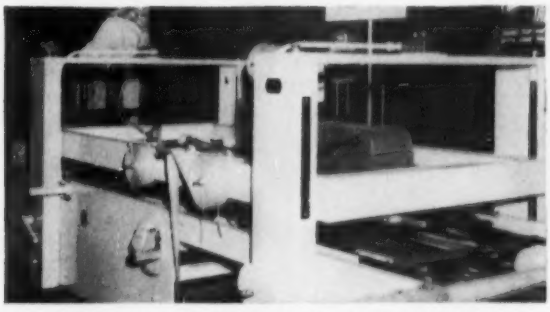
CONSTANT-SPEED, dual-label magazine unit labels 300 jars or bottles per minute. Rugged machine designed for quick changes in size and cleaning. Has gears running in oil; no-bottle, no-label safety; and variable-speed drive. Built by Jagenberg Co., Dusseldorf, Germany; displayed by Pneumatic Scale Corp., Quincy, Mass. (88E)



CAN-CARTONER runs at 83 six-can-packs per min. Easily adjustable for various can dimensions. Machine employs low-cost wrap-around method of placing cans on top of carton blanks, which are tightly formed around cans to position-lock and glue-seal them under heavy pressure.—Gardner Board and Carton Co., Middletown, O. (89A)

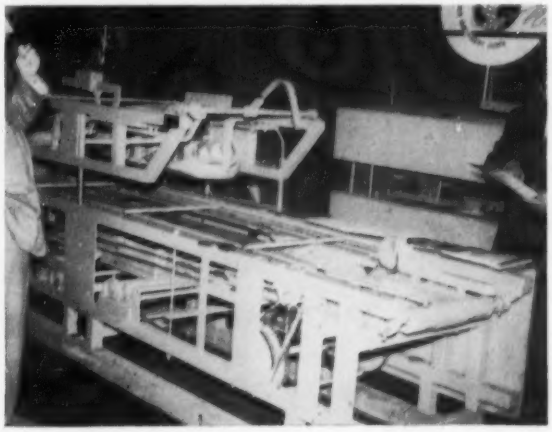
2 CAN CARTONERS • 3 CASE MACHINES

UP TO 750 cans per min. is speed of this can-cartoner. It handles 6 to 16 oz. cans in 2x2 to 2x6 canned packs. Changeovers made in 12 to 15 min. for different size cans. Machine employs wrap-around method of cartoning. Takes up 4x20½ ft. space, with 12-ft. compression section.—Morris Paper Mills, Chicago. (89B)



STRAIGHT-THROUGH unit glues and seals cases (top and bottom) in one pass. Tape cut to required length without need of transverse taping. Roller applicator spreads glue evenly. Hand-crank adjusted for different container sizes within 3 min.—Clybourn Machine Corp., Chicago. (89C)

4-IN-1 MACHINE opens and forms cases, accumulates and injects load into case, and then glues and seals it. Featured are pneumatic drive for all operations, enclosed glue-application system, controlled pressure sealing, and compact rugged construction.—Schroeder Machines Corp., Syracuse, N. Y. (89D)

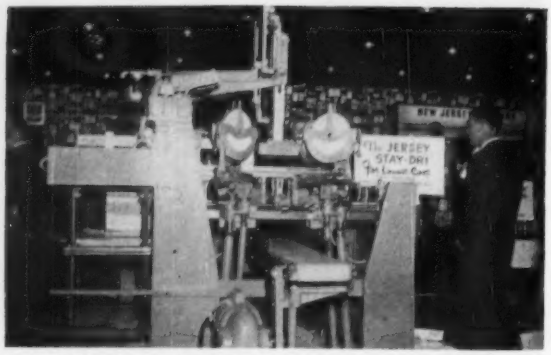


SHORT CASE SEALER (14 ft.) automatically glues and compresses within the machine. It will seal both top and bottom flaps, is quickly adjustable. Other features are: only one motor, safety clutch, no limit switches, easy cleaning and maintenance.—Elliott Mfg. Co., Fresno, Calif. (89E)

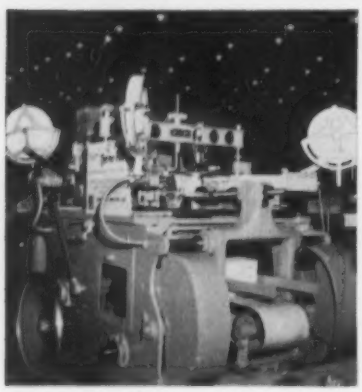
Turn page for more units →

7 UNITS MAKE, SET UP CARTONS, TRAYS

SENSATIONAL 180-deg. pre-breaking gluer is built for large, high-volume boxmaker. Machine at show was forming 1,200 tea cartons per min. from die-cut blanks. Versatile unit handles regular straight-line, double sidewall, compound fold, compound fold double sidewall, and many types of multiple fold cartons.—Post Machinery Co., Beverly, Mass. (90A)



AUTOMATIC tray-maker is flexible for sizes between 5/16x1⅜x3 in. and 4½x12½x18 in. Changeover in sizes takes 15 min. Machine handles thermoplastic pre-coated kraft paper. Top feed hopper accommodates a 42-in. blank load. Suction pick-up works on warped and flat board. Output is up to 60 trays per min.—New Jersey Machine Corp., Hoboken, N. J. (90B)



NEW thermoplastic stayer automatically combines corner-cutting and quad-staying in one operation. Sets up 35-72 corrugated glassine boxes per min. Carton blank sizes: 3¾x8 in. to 16¾x20-3/16 in.—Stokes & Smith Co., Philadelphia. (90C)

RUNNING at speeds over 120 boxes per min., this machine feeds flat blanks (creased or scored) to machine-glue them into boxes in sizes from 2x2x¾ to 14x7x3½ in. Is quickly adjustable.—U. S. Automatic Box Machinery Co., Inc., Boston. (90D)

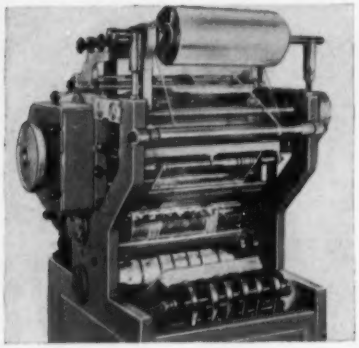
ADVANCED unit sets up cartons or trays from die-cut flat blanks through use of novel rope-type thermoplastic that is metered, melted, and applied to carton tabs to make a rigid, secure weld.—Package Machinery Co., Springfield, Mass. (90E)

FLEXIBLE UNIT forms and glues a wide range of straight or tapered cartons, with lid or double side-walls and double end-walls. Quick changeover machine forms 60-per-min. Has automatic and safety devices.—Meyer-Clement, Inc., River Grove, Ill. (90F)

ADJUSTABLE, vertical cartoning machine expands magazine-stacked flat cartons that are loaded by operators, and machine-tucked. Can be equipped with casters, empty-carton detector, coder, and strip-gluer for bottom flap.—F. B. Redington Co., Chicago. (90G)

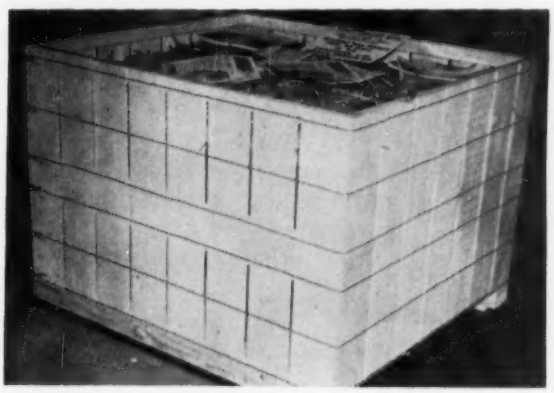
3 BAG MACHINES • 5 UNIT-LOAD ITEMS

AIR-OPERATED bag opener has air-flow regulator and adjustable holding clamp and guides. Products are guided through stuffing horn into opened bags.—Tele-Sonic Packaging Corp., New York. (91A)

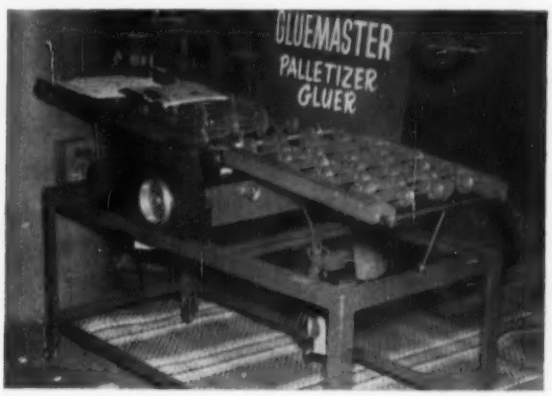


FOREIGN machine fabricates flat bags with cord-reinforced top. Handles static and non-static films. Makes different style bags in sizes from 2x3½ to 13x22 in.—Geveke & Co., Inc., New York. (91B)

AUGER-TYPE bag filler has built-in scale for accurate weight. Pushbutton unit feeds materials into clamp-secured bags (10-100 lb.) that are jolted.—E. D. Coddington Mfg. Co., Milwaukee. (91C)



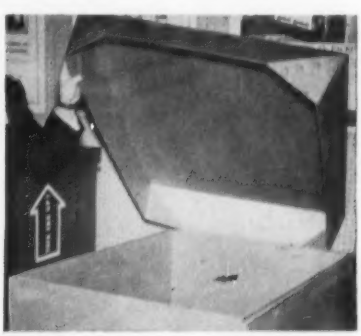
PALLET BOX for materials and products is wire-bound and equipped with runners to permit lift-truck handling. It may be stacked in warehouses, used for moving bulk quantities around plant, and for shipping. Box can be stored "knocked down" in little space, and assembled without nailing.—General Box Co., Des Plaines, Ill. (91D)



PALLETIZER GLUER applies gum to cartons, bags, or packages to hold them in position for higher stacking in storage or during shipping. One model spreads adhesive ⅛ in. wide on top of container. Another roller-coats two strips to max. width of 12 in. on bottom.—Kenneth J. Moore & Co., Chicago 26. (91E)

LP GAS fuels lift truck to cut operating and maintenance costs, and improve engine performance. Fuel system has self-sealing couplers and automatic shutoff. Engine coolant heats vaporizer.—Clark Equipment Co., Battle Creek, Mich. (91F)

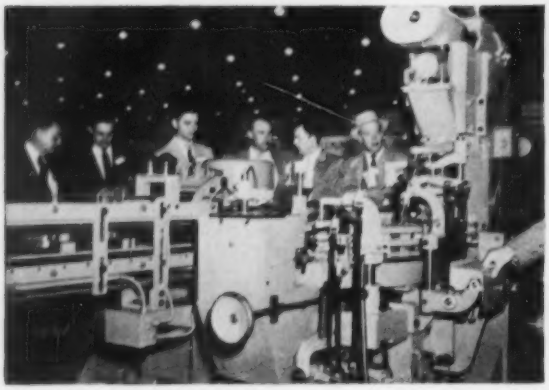
COLLAPSIBLE container that saves 70% of storage or shipping space for empties. Walls are 4-ply cord and synthetic rubber, with neoprene exterior. Cable inside provides dimensional stability.—U. S. Rubber Co., Providence, R. I. (91G)



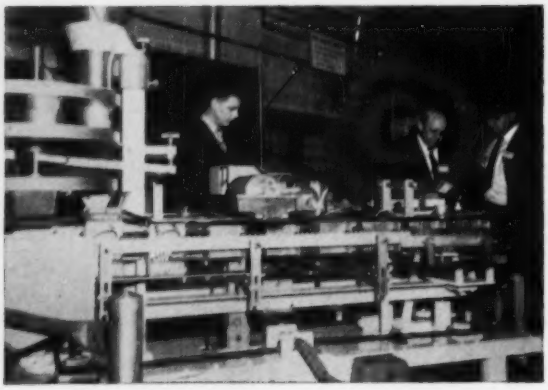
BULK BOX of heavy-gage, double-wall construction. Bottom and top are steel-strapped, and their sides fit between walls to avoid sifting. Holds half ton or more. Supplied flat, container takes little space.—Gaylord Container Corp., St. Louis. (91H)

Turn page for more units →

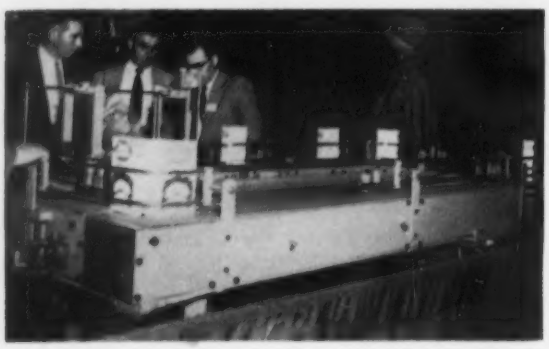
2 CARTON PACKAGERS • 2 CHECK WEIGHERS



82 PER MIN. is the speed of this carton former, filler, and sealer. Cartons are paper-lined. Unit has photoelectric registration for handling pre-printed reels instead of aniline printer.—Fr. Hesser Maschinenfabrik Aktiengesellschaft, Stuttgart, Germany. (92A)



CONTINUOUS carton filler and sealer does up to 60 per min., is hand-wheel adjusted, and has vibrator at filling station. Handles granular products. Is set-up for different sizes of cartons in ½ hr.—Clybourn Machine Corp., Chicago. (92B)



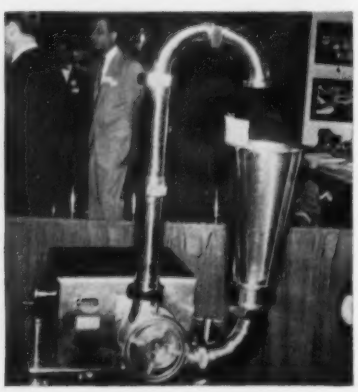
HIGH-SPEED check-weigher provides on-the-line detection of off-weight packages, at 80 per min. Suitable for cans, cartons, trays, packets, and small cases, up to 15 lb. Accuracy 1/16 oz.—Hi-Speed Check Weigher Co., Inc., Ithaca, N. Y. (92C)

130 PER MIN. is top speed of "in-line" check-weigher. Rejects "off-weights" as closely as 1/60 oz. Range is ¼ oz. to 10 lb. Cartons handled with pusher-type loader; cans or jars with worm-type loader.—Bartelt Engineering Co., Rockford, Ill. (92D)

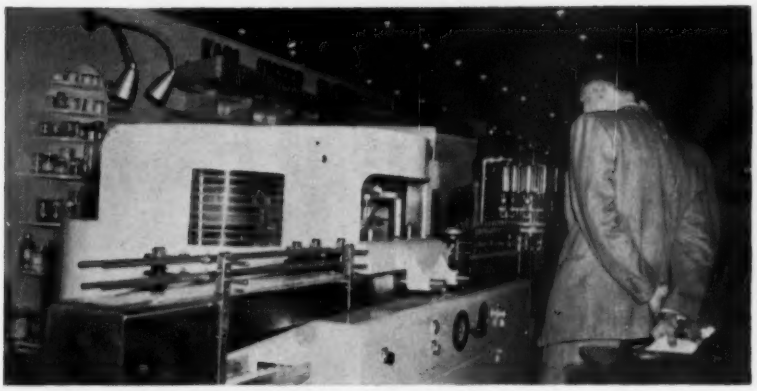
9 OTHER PACKAGING INNOVATIONS

THIS attachment draws weight-frequency distribution curve from weight calculator. Eliminates manual weighing. — Scale Specialties & Systems, Roseland, N. J. (92E)

MAKES pressure-sensitive cellophane tape in widths from ¼ to 1 in. Uses disposable glue pots. Handles standard taping operations. — Williamson Adhesives, Skokie, Ill. (92F)

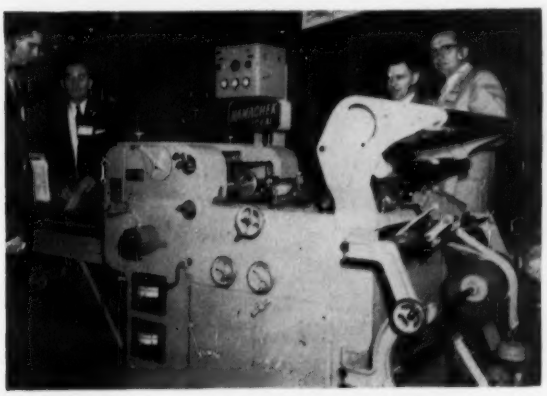


SHOVELING cottage cheese from vat to filler is eliminated by this sanitary pump. Unit has elliptical rotor with nylon vanes.—Anderson Bros. Mfg. Co., Rockford, Ill. (92G)

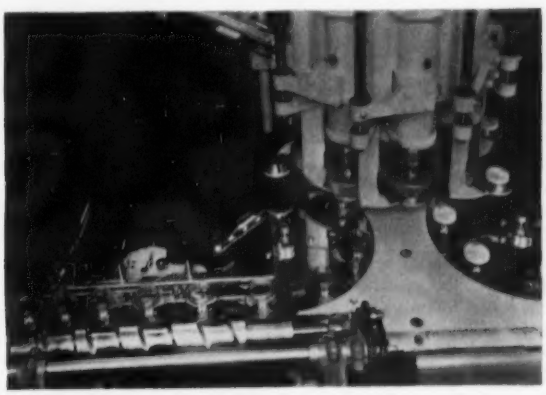


"BOTTOMS-UP" bottle cleaner operates at high speed and with minimum container breakage. Machine features mechanical design which reduces noise up to 75% to substantially lower employee fatigue.—Karl Kiefer Machine Co., Cincinnati. (93A)

LATEST CODER prints dates and other information on top of containers on conveyor.—Adolph Gottscho, Hillside, N. J. (93B)



NEW UNIT forms up to 18,000 single or duplex flat- or gusset-type cellophane bags per hour. Bag sizes: 1½x3 to 10½x30 in., with attachments for ¾x¾ to 3x30 in. Registers printed film without electric eye. Manufacturer: Frank Hamachek Machine Co., Kewaunee, Wis. (93C)

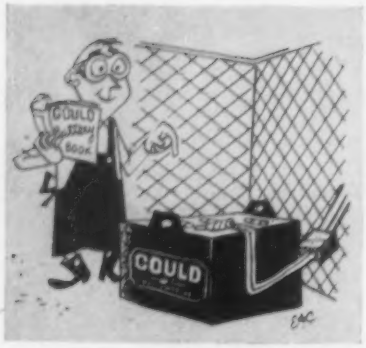


8-HEAD rotary capper features air chuck that eliminates troublesome fitting to cap style and insures efficient operation. Cap feeder prevents jams and breakage as caps are dribble-fed from supply hopper. Speed, 240 per min.—Pneumatic Scale Corp., Quincy, Mass. (93D)

NEW LABELER handles round containers from 4 oz. to 5 gal. Labels automatically fed, gummed, and applied to container at 5 to 18 per min., depending upon container size.—Atlantic Supply Co., Baltimore. (93E)

CARTON UNLOADER takes glass containers from 6 to 12 cases per min. and gently deposits them on unscrambler. Vacuum pick-up leaves broken or cracked containers in case. Each step in operation is individually limit-switch controlled to avoid jams. Vacuum cups open outer flaps, then inner. Suction head picks up containers, rotates 90 deg., lowers, and releases load.—Island Equipment Corp., Long Island City 1, N. Y. (93F)

For More Details, Circle Key Number on Readers' Service Card



Familiarity breeds respect

How Safe Is Your *Battery Room?*

For a quick answer, just pencil-check these 18 points covering the key maintenance factors

K. A. VAUGHAN

Manager, Field Engineering, Gould-National Batteries, Inc., Trenton, N. J.

Straight fact of the matter is that a number of hazards are inherent in handling and servicing storage batteries for industrial electric trucks used in the food industry.

Hence, it's most important to train and equip your battery men to avoid these maintenance dangers . . .

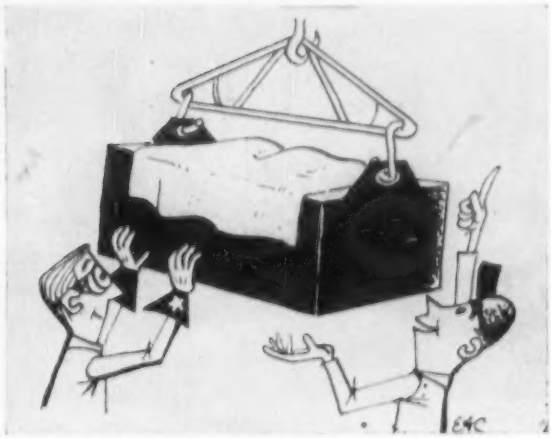
WHAT* They Should Do . . .	**. . . . And *Why***
1. Wear rubber apron, gloves, boots and goggles when filling, charging, or repairing batteries..... ☐	—As a protection against accidental spillage of electrolyte—a dangerous mixture of sulfuric acid and water.
2. Keep open flames away from the batteries. Never check electrolyte level with lighter or match. Use flashlight or adequate permanent lights..... ☐	—For the result may be a flame-caused explosion spraying electrolyte on the worker. And he'll need urgent attention. A cracked battery cover is the least damage.
3. Have water readily available to flush splashed acid from clothing, skin, or eyes. Use plain water and report to first aid at once ..... ☐	—For volumes of water, applied quickly and copiously, will prevent serious injury to skin. Quick medical attention is necessary to assure proper care and treatment.
4. Apply neutralizer, such as baking soda, when acid is spilled on floor, and clean up promptly..... ☐	—Because baking soda neutralizes acid and makes it safe to clean or flush from floor.
5. Take care in melting sealing compound when preparing to seal a battery. Avoid puncturing hard surface of partially melted compound with sharp tools. Never allow compound to ignite by too rapid heating..... ☐	—Because hot liquid may spurt up and burn hands, face, or body of a workman. If it should catch fire, it creates an open-flame hazard. Burning consumes oil in the compound and impairs its useful characteristics.
6. Remove vent caps and blowout nearby cells to remove gas, when preparing to reassemble a repaired cell into the battery. Cover vent holes with layers of damp cloth before using lead-burning equipment. Also, use dark glasses to protect the eyes..... ☐	—Since lead-burning equipment or an acetylene torch, normally used, are hot enough to cause hydrogen to explode—a hazard that should be recognized at all times. Further, strong light rays and molten metal can harm worker's eyes.
7. Shut off power when handling plugs connected to the charging equipment, to prevent short-circuits and arcing ..... ☐	—Since a short-circuit may injure a workman, and arcing can cause explosions and fire, due to presence of hydrogen gas.
8. Open, or "break" the battery circuit before removing terminal lugs from receptacle when repairing a damaged or dirty plug or receptacle connected to a battery.... ☐	—For leads terminating in receptacles are live. Total battery voltage is across the terminals. Hence, if lugs are touched together, dangerous arcing will occur.
9. Wear protective clothing and goggles when mixing acid and water. Always add acid to water and stir constantly to mix well. Store acid in lead or glass..... ☐	—Reason being that water does not readily mix when added to acid. Acid will splash, due to great difference in specific gravities of the two liquids.

*** Where *your plantmen* follow the practices described, just "X" the squares. This will give you a working measure of your system. And points you *don't* "X" are the places to institute action.**

Guard against that splash

Please—no matches here

Experts only need apply



Save your back—and feet

What . . .	*Why . . .*
10. Handle battery with hoist, crane, or rollers of ample strength. Cover battery with rubber mat to prevent short-circuits, in event cables or chains fall on it. . . . ☐	—For heavy load of a battery can cause strains or injury to worker's hands and feet. Also, battery may be seriously damaged, or electrolyte spilled, if battery drops.
11. Lock charging plugs and receptacles—make other connections tight and free from friction. . . . . ☐	—Since loose connections can start sparking, or even arcing, with attendant danger of a gas explosion.
12. Disconnect battery from truck when doing maintenance work on motor or electrical system. . . . . ☐	—A live current can cause arcing or short-circuit, with damage to equipment or injuries to workers.
13. Restrict battery room to authorized personnel, qualified by training and experience to handle battery. . ☐	—For untrained persons may unknowingly break rules for proper handling—causing injuries or damage.
14. Never lay tools on top of an open battery. . . . . ☐	—Since battery will be quickly discharged by short-circuit.
15. Guard all bare wires and buss bars in battery room from general plant traffic . . . . . ☐	—For any open high current transmission equipment is a possible hazard to workmen and plant.
16. Check batteries for cracks and leaks. Repair at once . . . . . ☐	—To avoid acid spillage and lowering of battery capacity, as well as danger to personnel and equipment damage.
17. Drain scrap batteries of electrolyte and flush them with water . . . . . ☐	—So there can be no residual voltage to cause an accidental spark.
18. Keep themselves familiar with proper rules for handling and charging batteries . . . . . ☐	—Since full knowledge of batteries and dangers of improper handling pays dividends in stopping injuries.

His job is easier because his truck is cooled with **COLDMOBILE**

With Coldmobile, the driver has no sensitive controls to adjust. No defrosting is necessary. Truck temperature is automatically controlled to stay consistent even after many door openings. Cool air is continuously circulating throughout the truck to keep all meat, poultry or any perishable always fresh . . . constantly protected.

Coldmobile Units Are Truck-Powered for Big Savings Here's real economy! No separate engine or batteries are required for refrigeration. Maintenance for these "extra" units is eliminated, and truck refrigeration becomes the by-product of driving. Yet Coldmobile units operate at peak efficiency with little effect on fuel consumption.

Easy to Install, Easy to Maintain. Units are sealed at the factory. No oiling or greasing is necessary, for all moving parts have sealed-in lubrication.

Models for Stand-By Operation. Model L (wt: 350 lb.) operates only when truck is running. Model LE (wt: 550 lb.) has convenient plug-in for stand-by operation. Model Split LE (wt: 600 lb.) with plug-in for trucks of low body height. All units provide more BTU capacity per pound *than any other truck refrigeration unit.*

For complete information write

UNARCO

COLDMOBILE DIVISION

UNION ASBESTOS & RUBBER COMPANY

2900 W. VERMONT AVE. • BLUE ISLAND, ILLINOIS

"We Doubled Inspection Performance *With a Caser"*

Automatic "picker" gently loads four 1-gal. jugs of milk into case. Thus, two men who had done heavy manual packing are now freed for improved quality check of jugs . . . System tightens controls, curbs breakage

A. GEISS
Production Manager, Bowman Dairy Co., Chicago

Keeping up with the zooming demand for fluid milk in 1-gal. jugs—which sparked a sales increase of 300% between 1950 and 1954—was no problem for us, production-wise, at Bowman Dairy Co.'s River Forest, Ill., plant.

But we did have a big hurdle to jump in getting a better and closer check on the final quality details of our gallon-pack, while at the same time assuring removal of much of the old effort and monotony of the task.

Here, we finally found the answer in mechanizing the loading of jugs into cases–and thereby freeing two case packers for inspection and other duties.

The caser, manufactured by Walker-Wallace, Inc., was the first installed for handling the 40-per-min. output from a rotary filler having 24-valves (12 of which are plugged up). The new unit automatically packs four gallon jugs at a time into a case–a job formerly assigned to two men. Each transferred two heavy jugs at a time from a rotary accumulating table and into a case.

Job simplification and improvement of inspection of products have constantly been objectives at Bowman. And installation of this caser is an example of the company's steps to take hard work out of its plants so as to permit operators to devote more time to inspection and quality control. In effect, we doubled our inspection performance.

Here are three outstanding merits of the new caser:

1. It abolishes former manual lifting of 21,000 lb. of milk hourly.

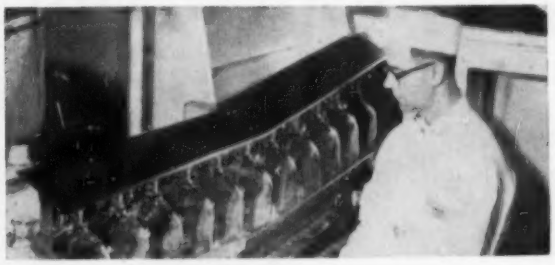
2. It assures higher efficiency in bottle inspection. Reason is that only one of the former case-packing men is required. And with no manual work to perform but supply caps to the capper, he now has more time to give bottles a thorough final inspection at the new automatic jug "picker."

3. It reduces breakage, since there's no hand-bumping of jugs with the mechanical unit.

Jugs are discharged from a 4-head rotary capping ma-

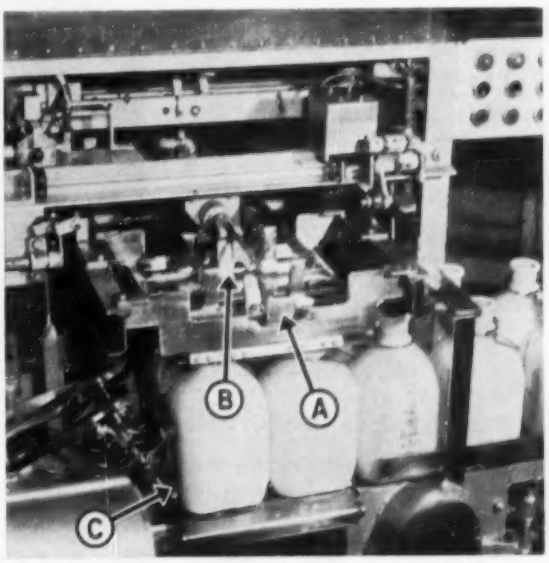
(*Turn to page* 168)

Gallon-Jug Caser in Action



INSPECTOR first checks empties coming from automatic washer. Rejects are returned for re-wash.

ANOTHER INSPECTOR now examines double row of gallon-pack milk on way to automatic caser (rear).



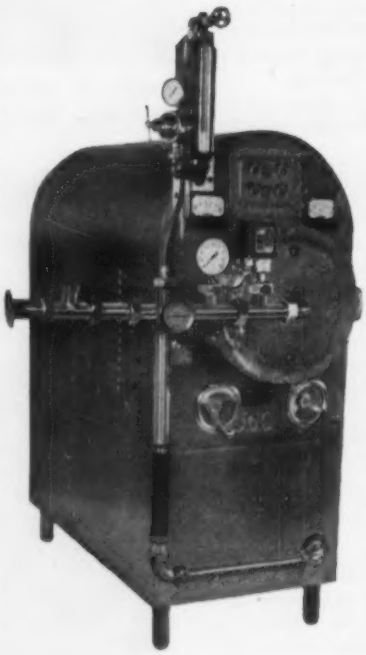
CLOSEUP shows caser's carriage (A). It has two pairs of clamps (B) to pick up four jugs for case loading. Feeler arms (C) start operation.

Whipped Butter with Profit

by Continuous, Automatic Mixing!

Attractive profits are possible with continuous automatic mixing because you get better quality, a controlled, uniform overrun, and lower operating costs. The Oakes mixer produces a fine cell structure that makes for a better spreading, better tasting, better eating butter of a quality not otherwise obtainable. Straight line production can be had from storage to package.

A degree of mixing not possible with standard beaters or similar



devices is attained. Air or inert gas is broken down into very fine cells evenly distributed throughout the product, as is essential for stability, quality, and velvet texture. The Oakes mixer further eliminates needless handling, and permits uniform packaging with constant overrun. Mechanical controls assure absolute uniformity and weight.

Here is a streamlined means of developing and maintaining consumer preference for whipped butter of profit-making quality!

The E. T. OAKES Corporation

Commack Road, Islip, Long Island, New York

MAMMOTH grocery and produce distribution center, located in suburban Chicago. Grocery and processing building (background), and produce building (foreground) replace three crowded warehouses in city. Building design is marked by straight-line, in-and-out flow of goods for low cost operation.

New Cost-Cutting Warehouse Has 4-Point Efficiency

1. **Streamlined one-floor operation**
2. **Economical materials handling**
3. **Convenient multi-tier storage**
4. **All-weather rail and truck docks**

FE STAFF

More speed in order assembly—with resulting low labor costs—is the rule at a new distributing warehouse built by Consolidated Foods Corp.

Located 12 miles south of Chicago's Loop, this giant depot replaces three warehouses located in the heart of the city. It maintains a normal inventory of 725 freight loads in two adjacent one-story buildings. Each building is equipped with second-story office space. The larger building handles grocery warehousing and processing—the smaller, produce.

Processing Activities

At present, processing consists of roasting and packaging coffee, mixing and packaging teas, and packaging of peanut butter, extracts, also spices.

Combined floor area of the two buildings is 567,000 sq. ft., of which 540,000 sq. ft. is ground-floor space. The processing area occupies 70,000 sq. ft.; the produce building, 45,000 sq. ft.

The grocery warehouse has a steel-truss and precast concrete roof, with a clear inside height of 20 ft. It is 1,040 ft. long and 480 ft. wide.

Handling System

Most of the inbound food is received by rail. A maximum of 20 cars, located entirely inside the building, can be unloaded at the same time. Inbound truck goods are accommodated by six doors located in another part of the building.

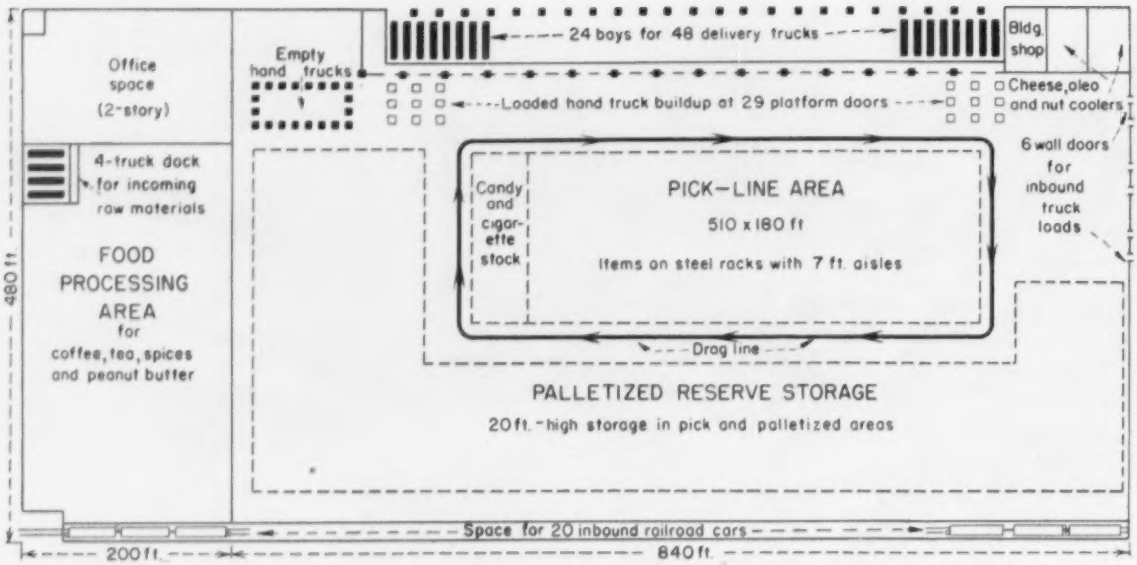
Raw materials to be processed arrive at a special enclosed bay in the processing area. A covered dock provides space for 48 trucks to be loaded for route delivery.

Warehouse floors are all level with truck and freight-car doors, for efficient materials handling.

Storage Features

The unloaded products are immediately palletized and stacked, either in the reserve stock or the pick-line area. In the latter, goods are loaded on steel racks, three tiers high, separated by 7-ft. aisles.

Key units in this handling system are the maneuverable, electric fork trucks. These are employed to fully utilize the 20 ft. of stock-loading height under the roof trusses. Outrigger base design permits trucks to


Office space (2-story)
Empty hand trucks
24 bays for 48 delivery trucks
Bldg. shop
Cheese, oleo and nut coolers
Loaded hand truck buildup at 29 platform doors
4-truck dock for incoming raw materials
FOOD PROCESSING AREA for coffee, tea, spices and peanut butter
Candy and cigarette stock
PICK-LINE AREA
510 x 180 ft
Items on steel racks with 7 ft. aisles
6 wall doors for inbound truck loads
Drag line
PALLETIZED RESERVE STORAGE
20 ft. high storage in pick and palletized areas
480 ft
Space for 20 inbound railroad cars
200 ft.
840 ft.

FLOOR PLAN of grocery building shows reserve stock, pick-line and processing areas. Power-driven dragline (1,360) ft.) cuts manhandling of merchandise, and speeds order selection.

straddle loads and make complete turns in 6 ft.

These flexible units have a maximum fork-lift height of 153 in. By double stacking loads of three pallets each, maximum height can be attained in the reserve-storage area.

Another mechanical feature is a power-driven, overhead drag line, supported from the roof trusses. This circles the 500x160-ft. pick line.

Order Assembly

To fill a store order, picker gets his IBM system invoices and selects a small hand truck from an assembly area near the office. Hand trucks have 30x48-in. platforms and roller-bearing wheels for easy pushing.

The picker proceeds on a tour through pick-line aisles, and selects invoiced items. The loaded truck is moved to the nearest point on the drag line, and attached to a hook.

Truck Assembly

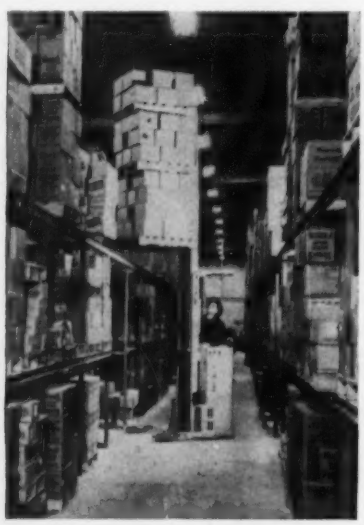
An outbound trailer-door number is marked on a plate attached to the hand truck, which then moves mechanically to a point opposite the proper opening. Here, truck is disconnected and assembled with others for subsequent trailer loading.

Other building features include fluorescent lighting, automatic heat from oil burning boilers and thermostatically-controlled unit heaters, modern locker rooms, and a fully equipped, air-conditioned cafeteria (operating on a non-profit basis). All of these contribute to employee satisfaction and efficiency.

No truck or trailer repair shop facilities are provided, since all deliveries are made by contract or leased trucks, on which maintenance is furnished by vehicle owners.

At present, the 33 acre plot has only two-thirds of its area occupied by buildings. This offers Consolidated considerable room for future expansion.

DRAG LINE moves loaded hand truck toward load-assembly point from pick-line area. (background).



THREE LEVEL pick lines are stocked by maneuverable fork truck.

Margarine makers need '999'

So do makers and processors of beer . . . candy . . . canned foods . . . cereals . . . malted milk . . . mayonnaise . . . meats . . . olives . . . sauerkraut . . . seasonings . . .

Morton '999' Salt
for better flavor and quality

Morton '999' Salt insures uniform flavor and quality in processed foods for two reasons:

1. Morton '999' is *guaranteed* always to contain more than 99.9% pure sodium chloride. The remaining 0.1% (or less) is a neutral inert sodium salt—and never bitter calcium or magnesium compounds.

2. Morton '999' Salt is produced by vacuum pan evaporation to assure you a salt that is clean, free-flowing... evenly soluble. '999' Salt is particularly low in objectionable trace metals.

For more information about Morton '999' Salt—and about Morton service and technical help—write this week to:

MORTON SALT COMPANY

Industrial Division, Department E9-6
120 South La Salle Street, Chicago 3, Illinois

For more information, use coupon on last page.

Increase food shelf life and eye appeal!

add OK DRI-SWEET (Corn Syrup Solids)

Processed foods containing *OK Dri-Sweet* remain fresh, tasty and fine-textured—and have the sales appeal of crisp, natural color.

Developed at the request of ice cream manufacturers, *OK Dri-Sweet* is ideal, also, for use in a variety of food products such as: bakery, confectionery, meats, frozen fruits, baby foods, preserves, jams, jellies, instant puddings, chocolate milk drinks, catsups, fruit juice powders, and many others.

OK Dri-Sweet is a pure, white crystalline, blandly-sweet product of many properties. It is an economical and versatile source of pure, nutritious carbohydrates. It functions in many foods as a moisture conditioner, an emulsifying agent, and helps retain and prolong the life of natural colors. *OK Dri-Sweet* emphasizes (does not mask) product flavors, prevents or controls crystallization of sucrose, produces smoother texture and better body, prevents oxidization, and improves crust colors in bakery products.

If your product needs any of these qualities, investigate versatile *OK Dri-Sweet* at your first opportunity! Hubinger technical experts will be pleased to work with you and put modern laboratory facilities at your service without obligation. Send the coupon today!

Better dry food mixes!

Manufacturers of dry food mixes will find many advantages in OK Dri-Sweet. The properties of corn syrup which have made it an important ingredient in a wide variety of food products are enhanced and increased with OK Dri-Sweet, a versatile corn syrup in dry solids form. It adds the properties of corn syrup to a finished product in an easy-to-use form.

OK BRAND

THE HUBINGER COMPANY
KEOKUK, IOWA

New York • Chicago • Los Angeles
Boston • Charlotte

Hubinger has served the corn starch and corn syrup needs of the nation for nearly three-quarters of a century.

THE HUBINGER COMPANY • Keokuk, Iowa

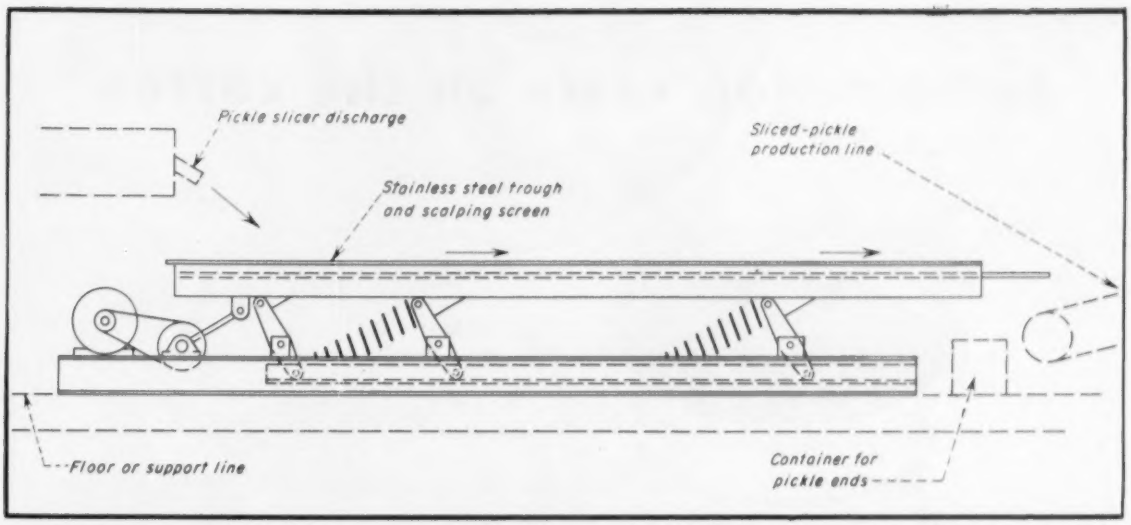
Please send, without obligation, full information on OK DRI-SWEET.

Name.....

Company.....

Address.....

City.....State.....


Pickle slicer discharge
Sliced-pickle production line
Stainless steel trough and scalping screen
Floor or support line
Container for pickle ends

AUTOMATICALLY, this vibrating conveyor removes ends, broken pieces, and seeds from pickle slices fed in by high-speed slicing machine (right).

Simply Separates Unwanted Pieces From Food Slices

Vibrating conveyor does top job in culling "ends" from pickle slices. Not only eliminates hand labor but also matches output of 300 bu./hr. slicer . . . Other food uses seen

FE STAFF

At the pickle-packing plant of H. W. Madison Co., Medina, Ohio, management had been seeking to cut inspection costs—and keep them cut.

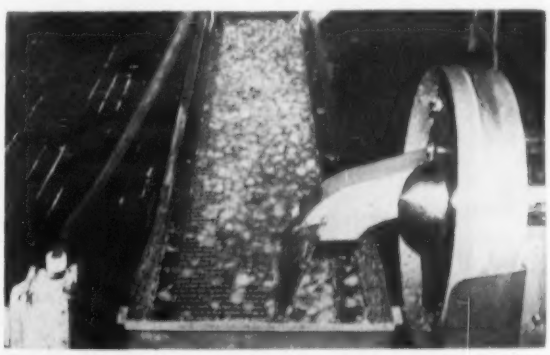
Trouble was that too much hand labor—more than six girls—was needed here to remove ends and seeds (7% of each pickle) on the line turning out slices.

Management's objective was to carry out this operation automatically. And the solution was finally found in the adoption of a vibrating conveyor (made by Stephens-Adamson Mfg. Co., Aurora, Ill.).

This unit, now specifically built for sliced food operations, is efficiently removing seeds and ends from pickle slices at the Ohio plant.

The new machine also has enabled this firm to step up its operating capacity so that speed of automatic separation matches the 300 bu./hr. output of the slicer.

▶ Foreseen are other uses of this equipment, such as separating pits from fruit and removing scraps and undersized pieces from other fruits and vegetables.



DETAILS of food slice separator. It has other possible food applications—such as removing pits from fruits or undersized pieces from other products.

Today, at the Madison plant, one attendant feeds pickles into an Urschel transverse slicer. This attendant also picks out any slices failing to pass through the vibrating-type separating conveyor.

In operation, sliced pickles are fed directly from the high-speed slicing machine onto the new unit's stainless steel vibrating screen deck (1¾ x 10 ft.). Then the vibrations, introduced by an eccentric drive (¾-hp. motor), move the slices along the deck.

Thereupon, the undersize and broken pieces and seeds fall through to a flat-bottom stainless trough. Conveyed along this trough, these separated materials then drop into a removable disposal container.

Meanwhile, the proper-size slices travel along the screen deck at a 30 to 40-fpm. rate, to be discharged at the next production stage.

The work of the eccentric drive is minimized by a counterbalanced frame, and conveyor supports accordingly are simplified. Size of scalping-screen openings depends upon the size of the pickle slices—$\frac{7}{16}$-in. mesh for 600-1,200 pickles, ½-in. for 1,500-2,400, and $\frac{5}{16}$-in. for 3,000 and up.

By changing mesh size of the screen decks, almost any sliced material can be handled by this separating machine.

It was found here that efficiency of the pickle-separating operation is largely influenced by selection of proper openings for the screen deck.

Satisfaction rests on the carton

Separated by thousands of miles, families every day sit down to enjoy this favorite dish, secure in the knowledge of its consistent wholesomeness. Quality control is important to Stokely-Van Camp right through to the shipping containers which protect this largest selling brand of Pork & Beans on its way to the nation's markets. That's why so many Stokely-Van Camp products are shipped in dependable Union boxes, quality controlled from pulp to printing in the world's largest integrated Kraft container plant.

TRADE MARK UNION
INTEGRATED PLANNING
INTEGRATED PRODUCTION

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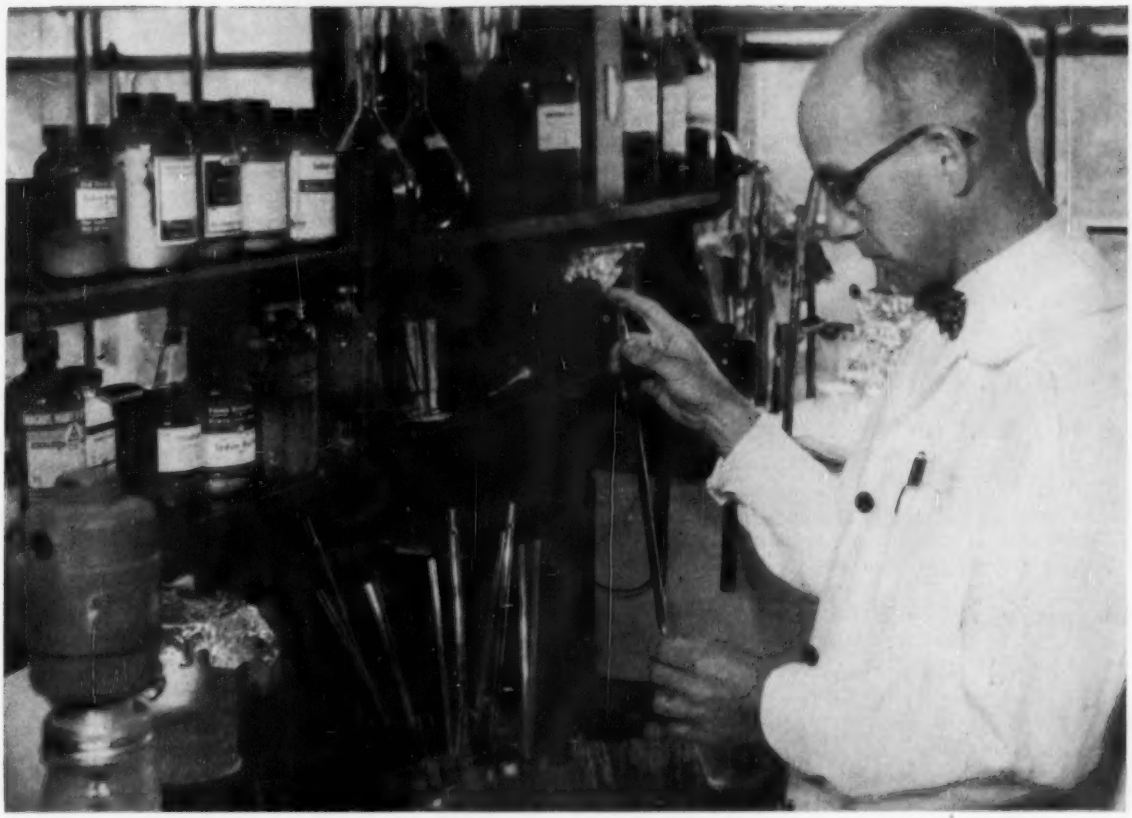


HIGH-QUALITY standards are maintained by regular tests. Here, technologist performs check for residual enzymes—prime cause of off-flavors. Such routine ties production and QC hand-in-hand for top product appeal.

Why Not a Food Technologist For *Your* Plant?

It's No Longer a *Luxury* to Have a Laboratory Man It's *Good Business*

GIDEON E. LIVINGSTON

Assistant Professor, Food Technology Department, University of Massachusetts, Amherst, Mass. (with photos by John H. Vondell)

A large number of small and even medium sized food packers neither have, nor feel they need, a food technologist in their plants.

The arguments which they advance to support this position are varied, but generally follow these three themes:

"Our plant cannot afford the expense of a full-time laboratory technologist,"

"This plant has been operating for many years without one, with no ill effects." Or,

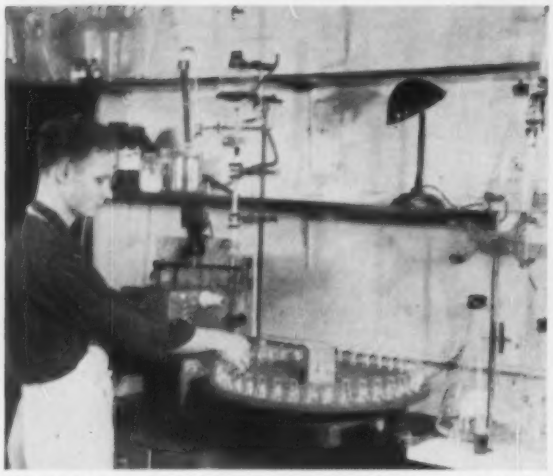
"What technical help or advice we require can be obtained from the container companies, trade associations, governmental laboratories, or failing all, by retaining a consultant."

There is some merit in these arguments. To attract good technical personnel, a small company is in direct competition with large industrial organizations which are in a position to offer attractive salaries, modern laboratory facilities, promises of advancement, and glittering vacation, medical, and retirement benefits.

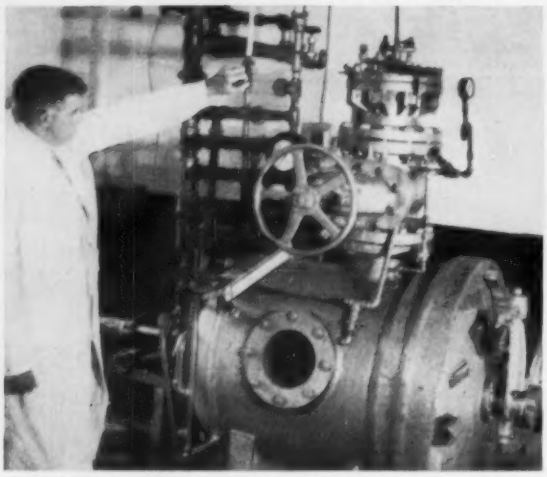
Many food plants have indeed prospered without the help of technologists, and succeeded in maintaining over the years satisfactory production records. Lastly, a wealth of technical data, available for the asking, is constantly being placed at the disposal of industry by many laboratories engaged in food research.

However, arguments in favor of a laboratory staffed by trained personnel, for even the smallest food plants, do take the above facts into considera-

Balanced Training Makes Better QC-Men.



THEORY is drilled into students. Analysis of products (above) provides background in food chemistry.



PRACTICAL application is a continuous theme. This pilot plant teaches production know-how.

tion. And the plus-benefits that may be derived are manifold and worth looking into.

His Plant Role

To begin with, let's examine the role of a laboratory chemist or technologist in a food plant. Though it is usually difficult to give his duties a clear-cut definition—particularly if he is the only technical man in the plant—his areas of responsibility generally cover the following functions:

Quality control: He inspects the product to insure the maintenance of quality within tolerances imposed by such factors as price, legal standards, or sales specifications.

When left to their own accord, product quality and high production records have a tendency to drift in opposite directions. The plant technologist, as the quality control supervisor, becomes the traffic cop who blows the whistle when fill, defects, color, mold count, or other criteria, show production to be hovering dangerously near minimum acceptable quality levels. By his consistent scrutiny of product quality, the presence of this man helps insure quality of pack.

Product development: Depending somewhat upon the type of products packed, the laboratory food technologist can often be of great assistance in formulation of new products. By drawing on his technical knowledge, he can not only suggest the proper ingredients required to produce wanted characteristics in a finished product, but can also determine processing or packaging requirements. Often he can even anticipate manufacturing or storage difficulties which might not appear obvious to an untrained eye.

Product improvement: In a field as competitive as the food industry, continued success is related to a constant search for methods of improving the products packed. Each new development in the handling or preparation of raw materials, or processing or packaging of foods, should be evaluated to determine whether greater economy or better products could be realized through its adoption.

A trained food technologist is well qualified to interpret technical and sales literature dealing with products and techniques. He not only can recommend or carry out experimental tests, but frequently can save his company time and effort where it is apparent that there is little to be gained by experimenting with a specific new development.

Sanitation: The average food technologist is usually not an expert on plant sanitation, but must often assume the responsibility. Being familiar with the requirements of the law and the problems involved in protecting foods, during storage and processing, from microbial, insect, and rodent contamination, the lab man can apply or modify such knowledge to the particular needs of the plant.

These are just a few of the functions fulfilled by a technologist in a small plant. There are many more, though they may vary from plant to plant. Interpretation of government standards or regulations, for example, constitutes a problem to many small food plant operators and could be referred to their technologists, who can also serve by bringing to the attention of management news of pertinent developments described in the scientific and professional literature. They may be charged with investigating potential sources of materials.

Not infrequently, it might be added, the presence of a competent food technologist in a small plant represents an investment in the future of the company by providing it with potential executive talent. It is largely because of this prospect of greater personal opportunity that a technical position with a small plant attracts energetic and resourceful young men reluctant to secure more immediate advantages at the cost of future loss in a larger company!

At this point perhaps a note of caution should be sounded: No technologist can be of value to his employer unless the latter has sufficient confidence in his judgment to grant him the latitude necessary to carry out his functions. It would be a fallacy to believe that the mere presence of a food technologist in a plant is tantamount to a guarantee of efficiency, product quality, and plant sanitation.

All too often it is observed that a technologist is hired only to "glamorize" a food plant, and while lip service may be paid to his suggestions, there is withheld from him the authority necessary to enforce the control measures needed to insure success of his programs. Under such conditions, the employment of a technologist is sheer waste.

How He Is Trained

Having indicated the potential usefulness of the technologist to a small food packer, we will examine the qualifications such an individual should possess. It may be said at the

(*Turn to page 209*)

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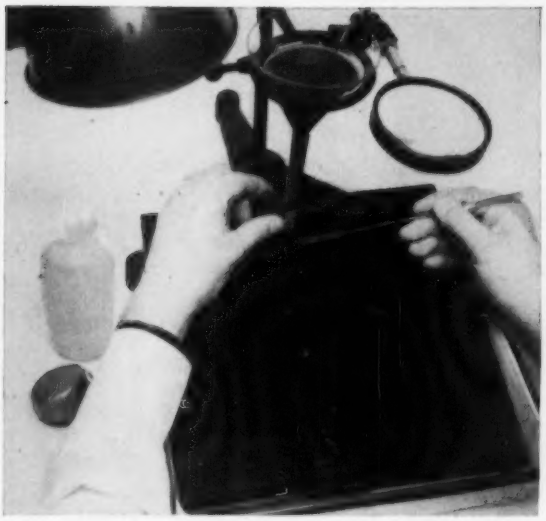


IN ASSAYING dyed tomato juice for fruit fly eggs or maggots, sample flows over black glass plate. Spatula is used to pick up matter for identification.

WHEN MAGNIFIED 30 DIA., egg stands out as pearly white body against selectively stained blue blackground. Generally, eggs are about 0.5 mm. long.

New Staining Technique Enables

In-Stream Control of Infestation

Cuts to a mere 10 min. the task of spotting organisms—which show up sharply in dyed tomato samples . . . Equipment, method detailed

N. W. DESROSIER, M. L. FIELDS, and G. R. AMMERMAN

Department of Horticulture, Purdue University, Lafayette, Ind.

To attain rapid, sure control of barely visible fruit fly eggs and maggots in tomato products is a specific processing problem.

It is to be noted that the official method of analysis* involves a delay of at least 1 hr. after sample preparation —a costly procedure in terms of lost production time.

In view of this need for an "in-stream" technique, there was sought a rapid and simple staining method that can be applied in the same way as mold counting. And tests now indicate the suitability of this approach for plant use.

First off, crystal violet dye (1% solution in alcohol) when added to tomato juice stains the particles a dark blue color. However, fruit fly eggs and maggots in their native state are unstained by the dye. Therefore, tomato products are selectively colored, while insect matter remains pearly white.

If present in tomato juice, for example, the contaminants are not detectable as such due to lack of contrast with tomato fibers and cellular constituents. However, with this staining technique, they are easily identified as pearly-white entities in a dark blue substrate.

And time required for an analysis is only about 10 min. under ordinary contamination circumstances.

This affords the processor the "in-stream" control of fruit fly eggs and maggots, not ordinarily discernable in the factory.

* A.O.A.C. (Assn of Official Agricultural Chemists).

Staining Procedure

If a tolerance of about three eggs and/or maggots is the maximum permitted in a No. 2 can of tomato juice, there should be less than one egg or maggot per 100 g. of juice sampled. In this method, latter is diluted with an equal volume of water. Then 4 ml. of a 1% dye are added and mixed, followed by standing for 1 min.

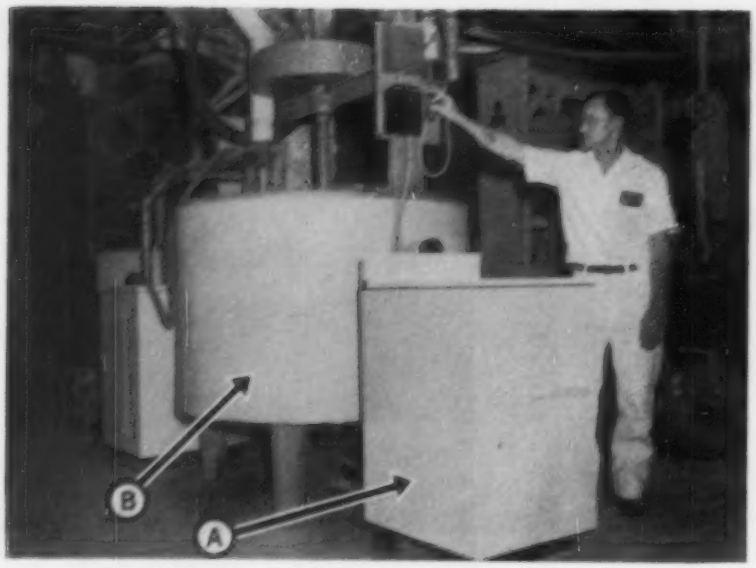
Dyed, diluted sample is poured into a glass funnel fitted with a piece of rubber tubing and a pinch clamp, or any other suitable arranangement. It is important

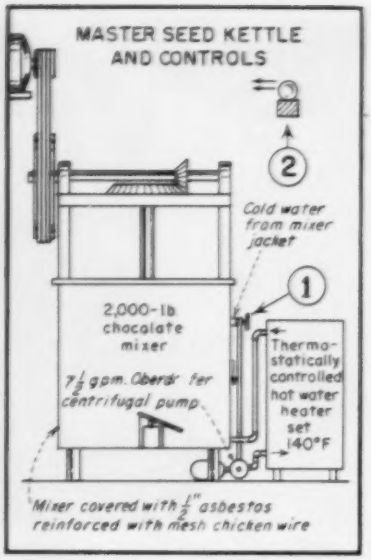
(*Turn to page 225*)

HOW DYE TECHNIQUE COMPARES With Official Method* on Commercial Tomato Juice

		A. O. A. C. Method		Dye Method	
Code	Drosophila Eggs Added to 100G. Lots	Egg Recovery	Elapsed Time (Hr.)	Egg Recovery	Elapsed Time (Min.)
1	5	1 3	1 2	6**	11
2	4	1 1	1 2	3	14
3	2	2 0	1 2	2	8½
4	1	1 2**	1 2	1	6

* A.O.A.C. (Assn. of Official Agricultural Chemists).
** Sample contained eggs in addition to known numbers added.




MASTER SEED KETTLE AND CONTROLS
2
Cold water from mixer jacket
1
2,000-lb chocolate mixer
7½ gpm. Oberdr fer centrifugal pump
Thermostatically controlled hot water heater set 140°F
Mixer covered with 1" asbestos reinforced with mesh chicken wire

SYSTEM "SET TO GO" comprises water heater (A) rigged to mixer kettle (B) to assure uniform temperature. Details are disclosed in drawing (right). Note specific controls: Immersion-type thermostat (1) that holds return water in 95-98 deg. F. range through operation of circulating pump, and Mercoid timer (2) that actuates agitator in mixer for 5 min. every half hour, thus keeping the seed batch conditioned.

Quick Way to Seed Coatings

All that's needed is household-type water heater thermostatically controlled to maintain uniform jacket temperature in mixer-kettle. Then 2,000-lb. batches of coating can be seeded within 1 hr. . . . Contrived by confectioner, idea is also a practical tip to bakers

JUSTIN J. ALIKONIS
Director of Research, Paul F. Beich Co., Bloomington, Ill.

A simple, economical, and rapid method of tempering chocolate or hard butter coatings has been developed in our plant—a technique designed to seed coatings five to ten times faster than the usual batch methods.

The system is applicable in bakeries as well as in confectionery plants.

Put briefly, we simply hooked up a conventional water heater, such as employed in homes, to an asbestos-insulated chocolate mixer. The heater is thermostatically controlled once it has been set at 140 deg. F. Water is then circulated from the jacketed kettle by a centrifugal pump.

Further, there is installed in the water jacket of the mixer kettle an immersion-type thermostat (Minneapolis-Honeywell, Type T415A323-XA3), which is set to hold this return water at desired temperature. And rigged to the rotating agitator of mixer kettle is a Mercoid timer, which is adjusted to operate the agitator at intervals so seed batch doesn't set too tightly (see drawing).

Speedy Seeding

For example, to make up a large batch of master coating seed, hard butter coating (101-105-deg.-F. melting point) may be fed into the chocolate mixing kettle. This mixer, operating at 14 rpm., then cool-mixes the batch to about 98 F. so that it becomes receptive to seeding.

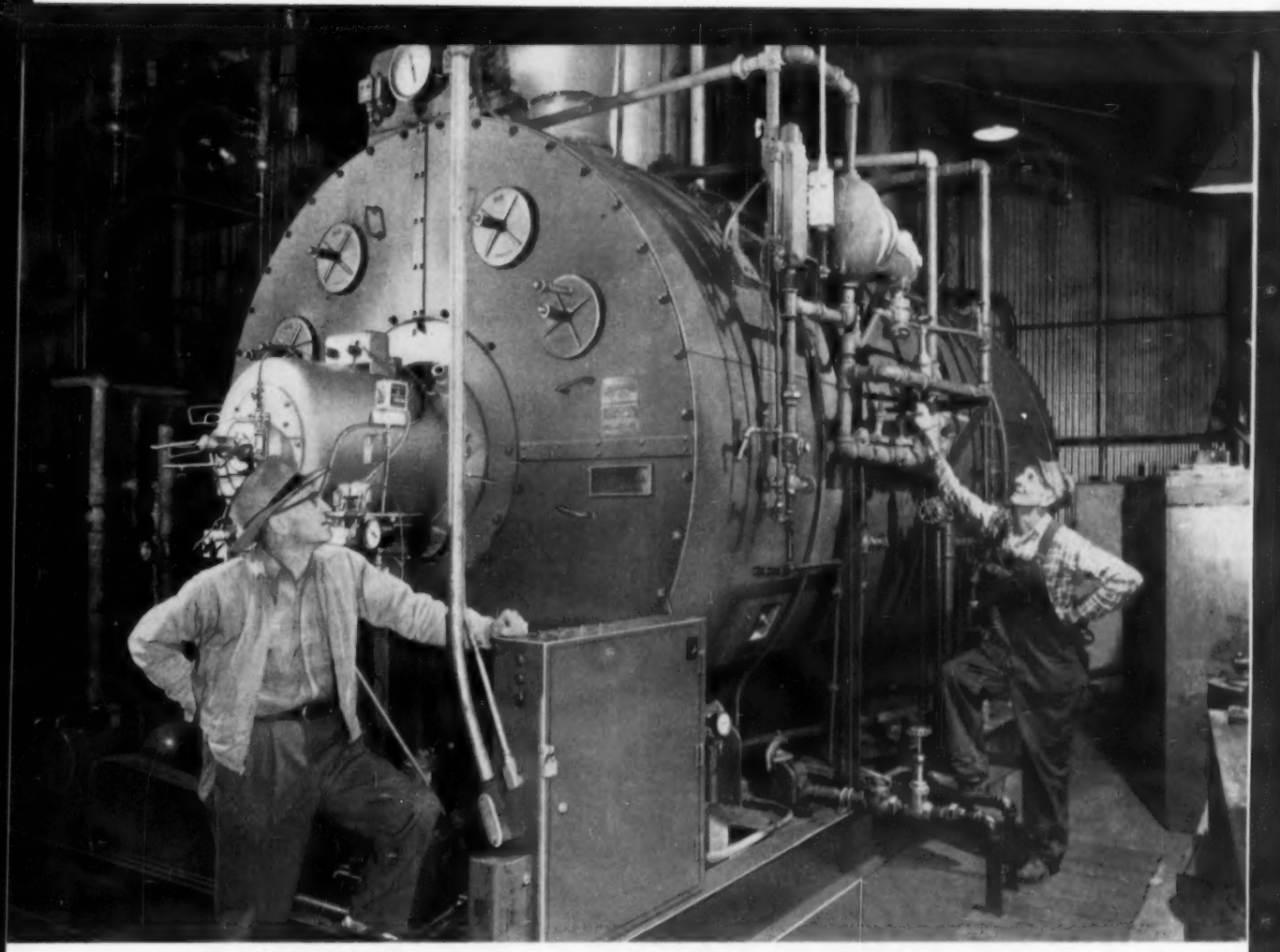
Added, then, is 20 lb. of air-cooled, hand-agitated coating seed to bring the 2,000-lb. batch to a semi-mushy stage. The 20-lb. seed batch can also be prepared in a small mixer, equipped with good scraper blades. Seed is cooled at 68-72 F. room temperature (with the aid of a spatula to scrape sides of the small mixer) to a heavy-mushy stage (below 90 F.).

With this master batch now properly seeded, temperature is thermostatically controlled (see drawing). Mixer kettle is then re-filled, after seeding enrobers, by introducing more fresh coating from coating-circulating line (102-105 F.) at a sufficiently slow rate so as to avoid affecting the master seed adversely.

As for seeding the enrobers: Toward the end of the day, we let the coating run out of enrober until there is not more than half of it left in the enrober-feed hopper (at least below the center of the agitator shaft). Then we raise temperature of coating to 110 F. to destroy accumulated seed. And then shut down the enrober.

Next morning, temperature of the enrober is checked in the usual way, and the coating is brought down below 98 F. so that it is receptive for seeding. Then, five to six buckets (100-125 lb.) of coating seed from master-seed batch is introduced. And coating in enrober is allowed to

(Turn to page 115)



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- ★ Automatic operating and safety controls
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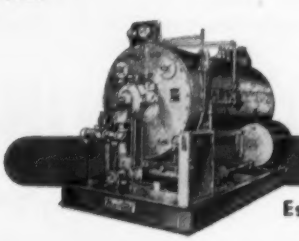
- ★ Smokeless combustion
- ★ One-source responsibility for complete unit
- ★ Nation-wide factory-trained service organization
- ★ Pay-As-You-SAVE Purchase Plan

This 500 HP *Powermaster* Packaged Automatic Boiler installed in a West Coast food processing plant has led to the purchase of four *Powermaster* units by other companies in the same area.

The reason for these extra sales is because *Powermaster* is solving two steam problems—more steam for processing, and more efficient off-season heating by means of modulating control of firing rate.

You can now purchase a completely factory-assembled and fire-tested *Powermaster* on the new Pay-As-You-SAVE Purchase Plan that helps you pay for your new boiler out of the savings it brings you.

Write for Bulletin 1220 or ask our representative to tell you how *Powermaster* can meet your requirements.



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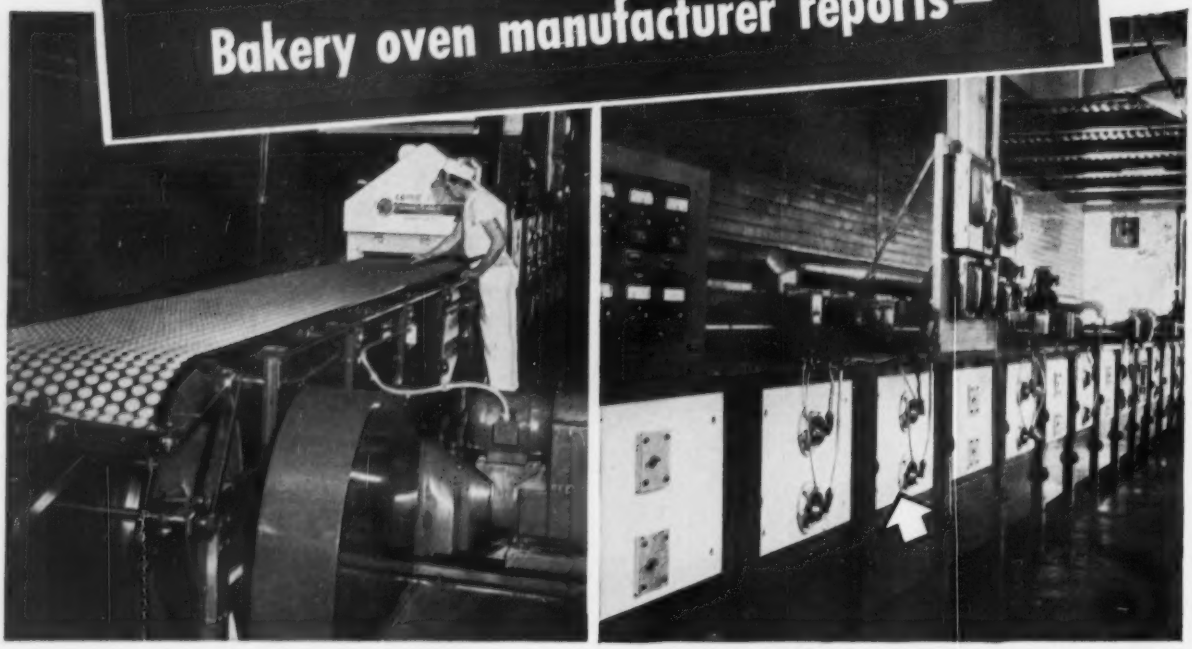
Bakery oven manufacturer reports—



Thomas L. Green & Company's new 100-foot band oven, built and insulated with Johns-Manville Marinite (shown by arrow above). Photos by courtesy of "Rippin' Good Cookies," Ripon, Wisconsin.

"Faster heating... better performance"

for ovens built of J-M Marinite

the non-corroding, structural insulating material

This leading bakery oven manufacturer, who designs for lasting customer satisfaction, obtains several major advantages by using Johns-Manville Marinite*, the structural insulating material:

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Equipment users find other advantages . . . In addition to superior performance, operators of ovens, driers and other high temperature equipment obtain almost unlimited service life from Marinite. This asbestos material combines structural strength and durability with efficient thermal insulation. It requires virtually no maintenance. It does not rot or corrode. It will not disintegrate in water. It requires no finish or protective facing for normal service.

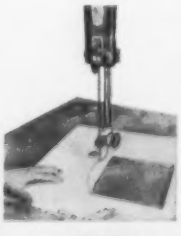
To learn how Marinite can improve your equipment, write Johns-Manville, Box 60, New York 16, N.Y. In Canada, 199 Bay St., Toronto 1, Ontario.

JM PRODUCTS

*Marinite is a registered Johns-Manville trade mark.

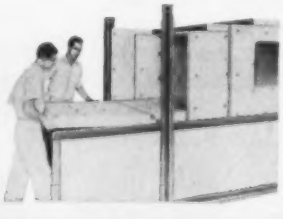
MARINITE builds and insulates in one operation

large, structurally strong sheets afford maximum heat control



MARINITE is easily worked

may be cut, drilled, shaped and fitted with ordinary woodworking tools



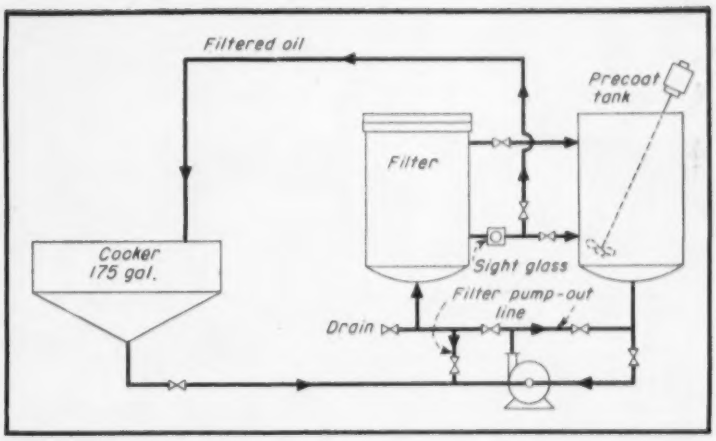
MARINITE speeds construction

can be erected without costly equipment— requires minimum angle-iron framing

Johns-Manville FIRST IN INSULATION

MATERIALS • ENGINEERING • APPLICATION

UNITS set up to filter cooking oil for potato chips and fried onions. With chips, batch filtering twice daily guards oil quality. For onions, continuous filtration is required.



This Filtering Of Frying Oil Assures . . .

Better Looking, Tasting, Lasting Products

R. T. GRIMM

Application Engineer, Niagara Filters Div., American Machine & Metals, Inc., East Moline, Ill.

Fried-food processors who still don't filter their cooking oil are missing a simple way to boost taste and eye appeal of their products—and shelf-life as well.

Query of these operators has been: "Why filter when fried items constantly absorb oil, and fresh oil is always being added?"

But this is overlooking the fact that, without filtration, a certain amount of burned particles are taken up by the final product. These specks taste bitter and detract from appearance.

At the same time, contact with charred particles accelerates oil breakdown and formation of free fatty acids—reducing life of potato chips, potato and corn sticks, french fried onions, and doughnuts.

Filtration is the practical solution. But to be effective, it requires a filter specifically designed for the job. Proper equipment will remove suspended matter completely. And there will be no possibility of off-taste and odor recontamination.

Below we detail two operations in which a pressure leaf filter (Niagara) successfully reclaims frying oil.

Potato Chips

Sliced raw potatoes, containing appreciable moisture, are delivered to cookers in which oil is kept at about 425 F. Cooling effect of raw potatoes lowers temperature to about 375 F. at the feed end. But long contact with hot oil caused charring of burned potato material.

Although particles settled to the bottom of the cooker, fine material remained in suspension, and left specks on the chips. However, a pressure filter station, similar to that shown in diagram above, easily overcame the difficulty.

This station consists of: (1) A 24-in. dia. vertical filter with 7 leaves on 3-in. centers, and having 42.5 sq. ft. net filtering area; (2) an open, steam-jacketed mix tank with agitator, and (3) motor-driven, 50-gpm. pump with 1½-in. piping and fittings.

Filter and mix tank are mild steel, leaves are 304 stainless, and pump and fittings are cast iron. All gaskets are special high-temperature and oil-resistant silicone.

Filtered Twice Daily

First circulation is during noon hour when the line is idle. Oil batches in the cookers are continuously circulated through the filter to remove suspended solids. When noon hour is over, filtering is stopped and cookers are returned to production. Filtration is repeated in the evening to remove solids accumulated during the 4-hr. afternoon cooking period.

A precoat of about 5 lb. of filteraid (Hy-Flo Super Cel, Johns-Manville, or Dicalite Speedplus, Great Lakes Carbon) is employed. Cake is scraped into the sump at the end of each run and then discharged through the cake-removal door into a can for disposal. This operation takes less than ½ hr.

At regular intervals, leaves are removed for careful steaming to release small particles. And less frequently, they are cleaned in strong caustic to maintain top efficiency. Since this filter does not use cloths, considerable cleaning time and expense are saved.

In the evening, oil is allowed to cool to 200 F. before being pumped through the filter. It is then stored in a holding tank until the 750-gal. cooker is thoroughly cleaned.

Only important difficulty was early failure of ordinary rubber gaskets. But this was solved by use of graphite-impregnated asbestos with neoprene cone.

French Fried Onions

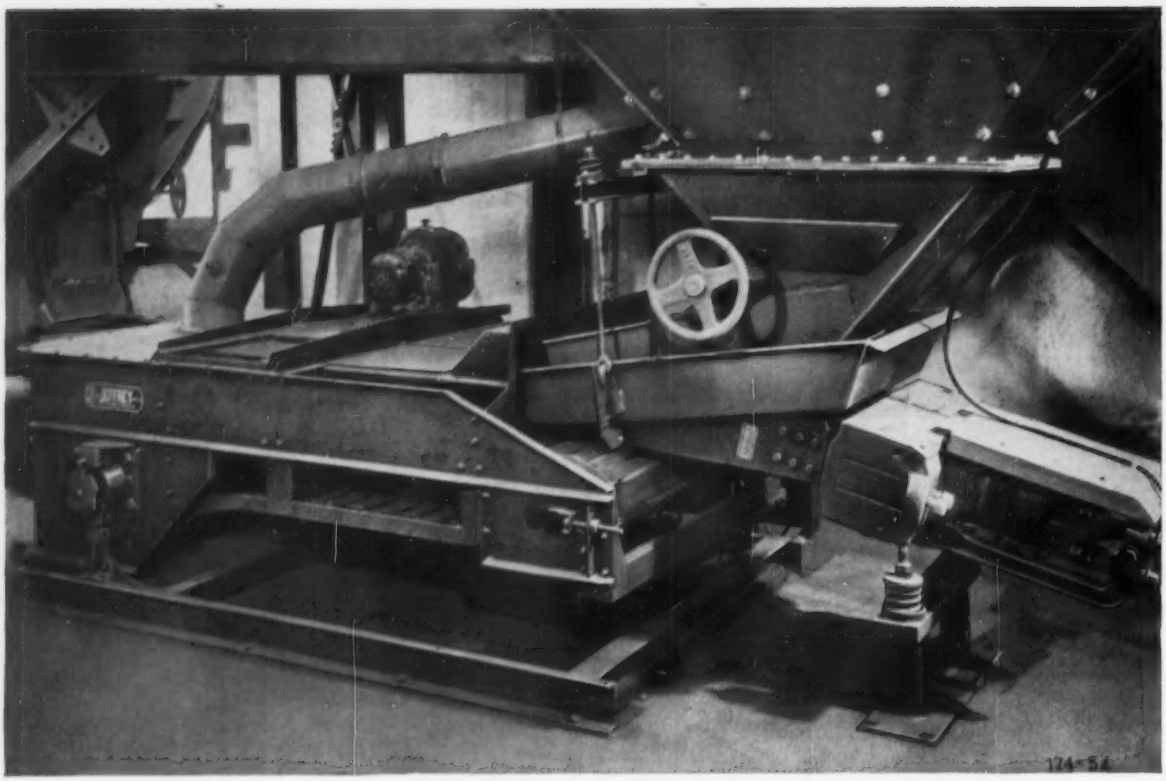
A company that was producing a line of canned potato sticks decided to add french fried onions. It used existing batch filtration equipment which had increased shelflife of the potato sticks from 4 to 12 mo., when used similarly to that described for chips.

But batch filtration did not work out well. Onion rings are coated with flour and batter before reaching the cooker. Consequently, they absorb five to six times as much oil as potato chips or sticks. Also, percentage of charred fine matter is greater.

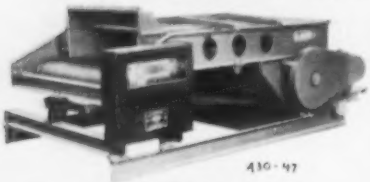
And service is more severe since natural onion oils and juice break down, causing the frying oil to turn dark and discolor the product. Oil changes from a light golden color to pitch black within 2 to 3 hr.

When the batch filtration failed, a duplicate station was installed for the onion line. Oil was then circulated through the filter during the entire cooking process—an average of 30 to 50 gpm., amounting to 40 to 67 gph. per sq. ft. As much as 4 cu. ft. of fine charred material is removed in an 8-hr. shift.

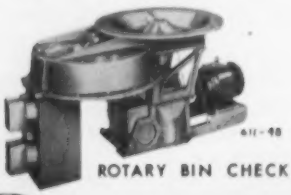
A 175-gal. cooker is employed in this line. In addition, about 125 gal. of oil are required to keep the filter and line full at all times. Onions absorb as much as 400 lb. (about 50 gal.) of oil per day.



ELECTRIC VIBRATING FEEDER



"WAYTROL" WEIGHBELT



ROTARY BIN CHECK VALVE

Jeffrey-Traylor "WAYTROL" feeds and weighs continuously

The Jeffrey-Traylor WAYTROL Constant Weight Feeder provides guaranteed accuracy within plus or minus 1% when belt speed is constant.

In the above installation a Jeffrey-Traylor Electric Vibrating Feeder delivers the material from the supply hopper. Its rate of discharge is controlled by an instantaneous, positive electrical system. It feeds to the Weighbelt which operates like a highly sensitive laboratory balance at constant or variable belt speeds.

If fine, fluffy materials are handled, a Jeffrey-Traylor Rotary Bin Check Valve is installed on the bottom of the supply hopper to assure continuous supply to the electric vibrating feeder.

The inherent accuracy of WAYTROLS is now serving many industries which handle scores of different products in their weighing and proportioning systems. *Write for full information.*

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PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

Cleaning Pipelines in Place

—*Continued from page 61*

soon apparent when leaks were observed at some of the fittings. Investigation showed that fittings had pulled loose from the pipes.

To overcome this difficulty the plant engineer designed and built clamps with a roller in their bases (see illustration). These enable pipe lines to be rigidly supported, yet permit lengthwise movement to compensate for variations in temperature of solutions and products. This type hanger has now been installed on all horizontal lines that are cleaned in place, regardless of length.

Successful cleaning of the two sections was followed by inclusion of lines from raw storage tanks to pumps supplying clarifiers and pasteurizers, and lines from balance tanks on the 3rd floor to filling units on the 1st floor. Latter comprise 5 Canco, 1 Pure-Pak, 1 glass, and 1 can filler.

By use of short, temporary sections to connect ends of lines supplying paper bottle filling units, and installing return lines from the glass and can fillers, 1st floor circuit was made.

On the 3rd floor two of the risers from filling lines are connected by a temporary line, and a new line was installed in front of the raw storage tanks. Now approximately 800 ft. of product lines are cleaned in one operation (see accompanying drawing).

Auxiliary Equipment

With increase in length of system the previously mentioned 2 hp. pump did not produce sufficient velocity to give satisfactory cleaning. It was replaced with a 5 hp. unit, and, finally this was replaced with a 10 hp. pump. The portable tank was replaced with a 2-compartment (150 gal. each) stainless tank, which is permanently installed in a small room adjacent to the pasteurizing area.

Water lines to the top of each compartment are equipped with steam jets to enable drawing of water at any desired temperature. And, a steam injector is installed in the line a short distance from the pump discharge. Feed to the injector is controlled by an automatic regulator with bulb in solution line about 5 ft. beyond the steam inlet. Regulator is set for 145-150 F. When higher temperatures are desired, valve in regulator by-pass line is opened to increase steam input.

A recorder, mounted on the outside wall of the tank room, with bulb in solution return line maintains a permanent record of solution and water temperatures.

The divided tank has proved its worth as an aid to speedier cleaning as it enables the cleanup man to prepare one solution while another is being circulated. For example, while lines are being flushed with water from one section—the first step in CIP operation—an acid solution is prepared in the other.

Fittings and Gaskets

Several types of fittings and gaskets were tried during the step-wise conversion from "take-down" to "cleaned-in-place" lines.

When the stainless line from raw storage tanks to processing was installed, standard fittings were employed. Ends of these were refaced to take a special plastic gasket. This method was also used with the 3-in. valves and lines from raw storage tanks to pumps.

When the lines from receiving to storage were changed over, however Tri-Clamp fittings (Ladish Co.) were installed. Similar fittings were also used in the processed products lines on the first floor.

Two types of gaskets were tried—Hy-Car and Teflon. However, the former discolored on use, and have been replaced with white Teflon.

Cleaning Procedures

The following four steps comprise the standard method employed in cleaning the 800 ft. pipeline:

1. Pumping of 100-110 deg. F. water through entire system until it runs clear at "broken" connection in return line near solution tank.
2. Circulating 145 F. acid solution (¼%) for 30 min., followed by a hot water rinse.
3. Circulating 145 F. ¼% alkaline solution for 30 min. followed by hot water rinse.
4. Circulating 180 deg. water to sterilize.

Also cleaned with the same equipment, but using a separate circuit are the homogenizers and HTST pasturizers (see drawing). Procedure for this operation follows:

1. Flush with 100-110 F. water.
2. Circulate hot (170 F.) alkali for 10 min., and rinse with hot water.
3. Circulate (170 F.) acid solution for 1 hr., and rinse with clear water.
4. Circulate 170 F. alkaline solution for 1 hr., flush with water for 20 min.

Plate units and homogenizers are then disassembled and further cleaned by brushing.

A further application of circulation cleaning in this plant is to the opposite sides of the plates in the HTST units, where brine is circulated as the cooling medium. To prevent scale buildup, which would reduce heat transfer, acid and alkaline solutions are circulated daily. Used is a small (50 gal.) tank and special pump.

Labor, Bacteria Down

Numerous changes in operating procedures and products made, that have occurred during the several years in which conversion from "take-down" to CIP was taking place, made exact labor savings difficult to determine. As an example, the steady conversion from glass to paper containers has increased cleaning time, as dismantling the paper fillers consumes considerably more time than was required with glass fillers.

During the last year, however, when the two final sections were incorporated in the CIP system, a reduction of approximately 27% in size of cleanup force has been effected.

Bacteria counts were made at regular intervals during the change-over by breaking joints and swabbing sections of the pipe line. They are now made at the rate of 30-40 twice monthly, each at a different point in the lines. Counts have been uniformly low.

Condition of pipes and gaskets have been observed visually at these times and, with the exception of the previously mentioned discoloration of certain types of gaskets, all were found satisfactory.

End (Resume reading on page 62)

Speedy Seed Coatings

—*Continued from page 110*

smooth out. Enrober is now filled with coating to normal dipping capacity, and the continuous-feed procedure is carried out.

We make certain that there is continuous feed of the same amount of coating from circulating line (102-105 F.) as is discharged from enrober onto coated goods. Several enrobers may be seeded from one master-seed kettle.

Normal dipping and feeding ranges will depend upon type and viscosity of the coating as well as percentage of coverage desired. Dipping range will vary from 95 to 100 F. and feeding from 102 to 110 F.

Once conditions have been properly set up to maintain gloss on goods for 15 days, procedures should not vary, unless results are unsatisfactory.

From practical experience, it has been shown that coated goods retaining gloss for 15 days will have good gloss for over three months.

End (Resume reading on page 113)

In Behalf of Progress . . .

Trends and Problems Challenge Packagers

Things are moving on the food-packaging front. But in some areas the industry has not caught up with the times.

Production bottlenecks are being broken by better machines. At the Packaging Exposition, FE editors found nearly twice as many new developments as the 1954 show (p. 82).

Machines are faster—take the new 3-in-1 labeler with its 300-per-min. throughput. They are more flexible—on some, handwheels make the size adjustments. Many perform more operations—forming, filling, and sealing. And there is a trend to automatic operation, with built-in safety controls.

Intriguing new materials and containers have been introduced. There is crystal-clear polyester film with phenomenal strength, −80 to 300 deg. F. range, and other desirable properties. Low-price, vacuum-formed plastic re-use boxes are coming along. And for bulk products, we now have collapsible rubber and fiberboard containers.

These developments offer new opportunities. But the challenge doesn't end there. Supermarkets want packagers to catch up with retail requirements.

Because warehouses must now be efficient assembly and distribution points—not storage depots—containers should be suitable for palletizing.

What's more, food ought to be better packaged for inventory and handling in the retail store. Needed is some relationship between case size and product turnover.

There are too many sizes and varieties of items for available shelf-space. Packages should be thoughtfully labeled on all sides, because they may be placed narrow-side-out to save shelf frontage. And many items in bags need to be designed for easier stacking in the store.

To avoid the use of damaging sharp tools for opening cases—and to save time—case tear-open strips are indicated. Convenient price-marking space is required on packages. Code dates ought to be easily seen to aid first-in-out selling. Packages should stand self-service abuse. And small items need protection against pilferage.

Another challenge stems from the hand-to-mouth buying by retailers. This is forcing unit-pack breakdowns upon manufacturers and wholesalers.

As never before, today's food container must be a good performer all along the line.

30 Years Ago and Now

You can thank the Department of Agriculture for a significant story of our industry's achievements in the past 30 years.

Progress in the three links of the Life-Line of America—agriculture, manufacture, and distribution—have been highlighted in the bulletin *More and Better Foods*. And strides for which food manufacturers can take much credit are presented in this issue (p. 55).

This article is pleasant pat-on-the-back reading. But it has a deeper purpose.

Food manufacturers have been lax in telling the story of their industry's great contributions—to better living and to the national economy. Here, now, is some "ammunition" that will hit the target in these areas. Put it to good use.

You might well start by posting it on the plant and office bulletin boards for all employees to see. Or print it in your company publication. It will make your people proud of the industry in which they work.

You might add some comparable facts about your company's achievements in this direction. Every successful food company can say a lot about more and better products—at lower relative cost. It can talk about the number of jobs it provides, too—and the investment in plant and equipment for each of those jobs.

But don't stop within your own walls. Spread this information in your community. And let some seep into the story you tell consumers.

There is much to be said that will benefit the industry in a variety of ways—from attracting and holding good employees to getting more enlightened attention in Congress.

But you and others in the industry have to say it.

Something New For You

You probably have met Ole Sage by now. He was introduced on page 79 with his first exciting episode in worker-management relations.

Ole will appear in future issues, too. He was created by FE to help food manufacturers with one of their biggest problems—effective handling of manpower.

Unless management is very much on its personnel toes, a business can be wrecked. And all too many food companies still are neophytes when it comes to dealing with their increasingly complex labor problems.

Ole Sage will stimulate your thinking—and at the same time give you practical pointers. The cases involved in his episodes, and the items from his "Notebook," are realistic. And they are directed at your problems.

Ole welcomes comments, criticisms, and contributions from your experience.

1. Call us up.

2. Tell us what you want to mix.

3. We'll give you guaranteed mixing results.

Need to mix fluids? Here's how to
do it right . . . without risk

Get yourself a mixer recommendation that takes *all* the risk out of fluid mixing.

Every LIGHTNIN Mixer you buy is unconditionally guaranteed to do the job for which it is recommended. This guarantee protects you . . . relieves you 100% from responsibility for successful mixing results. It saves you engineering time, and banishes guesswork from fluid mixing.

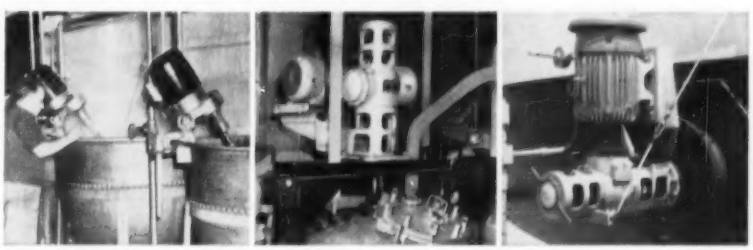
You can get LIGHTNIN Mixers to mix fluids in any quantity, in vessels of any size and shape. Thousands of LIGHTNINs are in use. Hundreds have been in service 20 years and more.

Easy way to solve mixing problems Just telephone your LIGHTNIN representative, and tell him what you want to mix. Chances are, he'll be able to give you a guaranteed recommendation and firm price *by phone*, without waiting.

(If your requirements are very unusual, he may take a day or so—seldom longer.)

If you don't have his name, write or phone us direct for a recommendation and price.

This extra-fast MIXCO service costs not a penny—can save you plenty. Why not get the facts you need *today?*



MIX, BLEND, SUSPEND, DISSOLVE . . . handle any fluid mixing job with LIGHTNINs. Hundreds of models—portable, top entering, side entering . . . propeller, paddle and turbine types, for open or closed tanks. Sizes ⅛ to 500 HP.

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Get these helpful facts on mixing: cost-cutting ideas on mixer selection; best type of vessel; installation and operating hints; full description of LIGHTNIN Mixers. Free—no obligation. Just check data you want, tear out and mail to us today with your name and company address.

- ☐ DH-50 and DH-51 Laboratory Mixers
- ☐ B-102 Top Entering Mixers (turbine and paddle types)
- ☐ B-103 Top Entering Mixers (propeller types)
- ☐ B-104 Side Entering Mixers
- ☐ B-107 Mixing Data Sheet
- ☐ B-108 Portable Mixers (electric and air driven)
- ☐ B-109 Condensed Catalog (complete line)
- ☐ B-111 LIGHTNIN Rotary Mechanical Seals

MIXING EQUIPMENT Co., Inc., 143-f Mt. Read Blvd., Rochester 11, N. Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 10, Ont.

Test Refinery Teams 5 Vegetable-Oil Lines

—enabling precise laboratory selection of the optimum processing technique for any oil, commensurate with cost factors . . . Plant has tank-car-a-day capacity

RECENTLY INSTALLED by The Sharples Corp., Philadelphia, is a new vegetable oil refinery for determining the most preferable method of processing any such product as salad oil, shortening, margarine, or the like.

With floor area running approximately 15,000 sq. ft., this plant and its laboratory facilities are available for demonstration, research, and economic studies on tank-car-a-day scale. Thus, production runs are simulated and full data are provided as needed by oil refiners for developing more profitable operations.

Any one of five processes—see details in diagram—can be applied in this plant to handle vegetable-oil "crude" and so establish the processing steps, proportion of reagents, and factors on recovery, grades, and losses, as well as an index to the cost of refining based on existing market prices.

Among the processing steps performed are removal of moisture, precipitation and removal of gums, neutralization of free fatty acids and their removal as soap, and reduction of color of the finished product.

Processes now applied here are soda ash, modified soda ash, ammonia, caustic, and modified caustic. And all have been made non-stop by use of a "ratiometer"—a company-designed and engineered positive-displacement pump and control arrangement.

For the story behind Sharples' processing technique, see this month's special feature article, "Proportioning System Paces Oil Processing"—on page 78.

By this device, reagents are added continuously and in correct proportion, regardless of the rate of flow of the oil.

General Processing Procedure

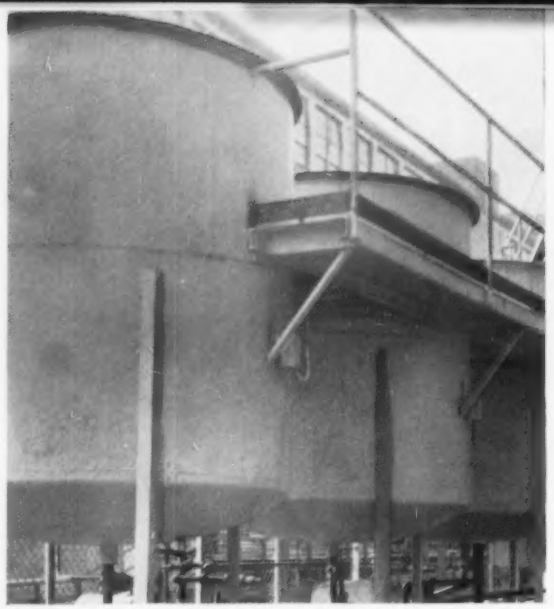
Oil is weighed in the tank car on a railroad platform scale, then is pumped to temperature-controlled and agitated storage tanks, from which samples are drawn for preliminary laboratory checks.

To start a plant run, oil is then weighed into the process in alternate scale tanks. Next, as the oil is drawn, the first reagent is added by ratiometer, mixed in the flow, and later centrifuged for the removal of precipitated gums.

One of the unique features is placement of weigh tanks throughout the system for precise gaging of every element of the crude oil which is either refined or removed as a byproduct or waste. Under such conditions, accurate comparisons of processes and variations in processing are possible, and the results can be reproduced with similar equipment anywhere.

The oils most commonly refined in the U. S. are derived from cotton seed, soy beans, peanuts, and corn. Foreign countries refine such products as palm, babassu, sesame, rapeseed, flax seed—and dozens of others.

Continuous refining calls for addition of specified quantities of such reagents as caustic soda, soda ash, or ammonia, followed by high-speed centrifugal separation of the gums and other contaminants. A series of such "treats", followed by water washing, and removal of moisture, produces oil of high quality and desired brilliant color.



HUGE STORAGE TANKS are mechanically agitated. And their contents are held at uniform temperature.

Refined oil is also checked at the end of any process to determine amount of recovery of finished refined products.

Chemically, the fact that caustic hydrolyzes neutral oils and causes losses has been recognized. And various reagents have been tried in order to neutralize the fatty acids but not saponify the soap, with more or less success.

Sodium carbonate became popular as a reagent in 1944, and ammonia is now under discussion in many quarters. However, any process using such a non-saponifying reagent has the disadvantage that color is not removed. It is necessary, therefore, to add another step for this purpose.

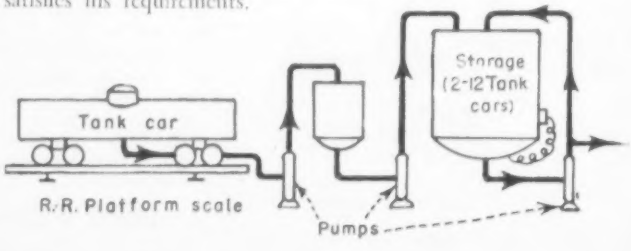
Here, it is interesting to note that caustic makes soap out of the neutral oil only in the presence of other soap and, therefore, a purified oil can be treated with caustic for the removal of color without significant loss due to saponification of the neutral oil.

Both the sodium carbonate and ammonia processes treat with the non-saponifying reagent first and then separate the precipitated soap and gums. The purified dark oil is then given a second treatment with caustic wherein the color bodies are precipitated and removed in additional centrifugal machines.

Throughout the runs, the laboratory stands by to make tests and determinations at any step. In this way possible shifts in procedure may be checked.

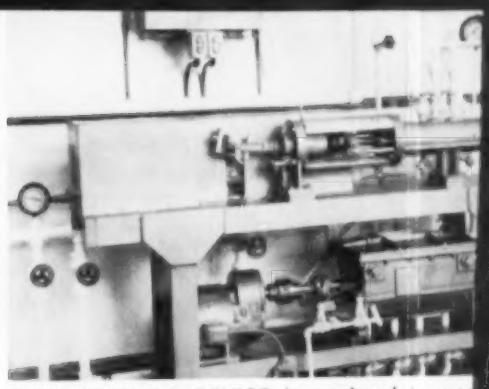
Being full scale, this research-and-demonstration refinery offers the means to attack and solve problems of oil refining, as well as to demonstrate the results by using any one of the five refining processes.

It also allows the refinery operator to study any new process and decide for himself whether the performance satisfies his requirements.

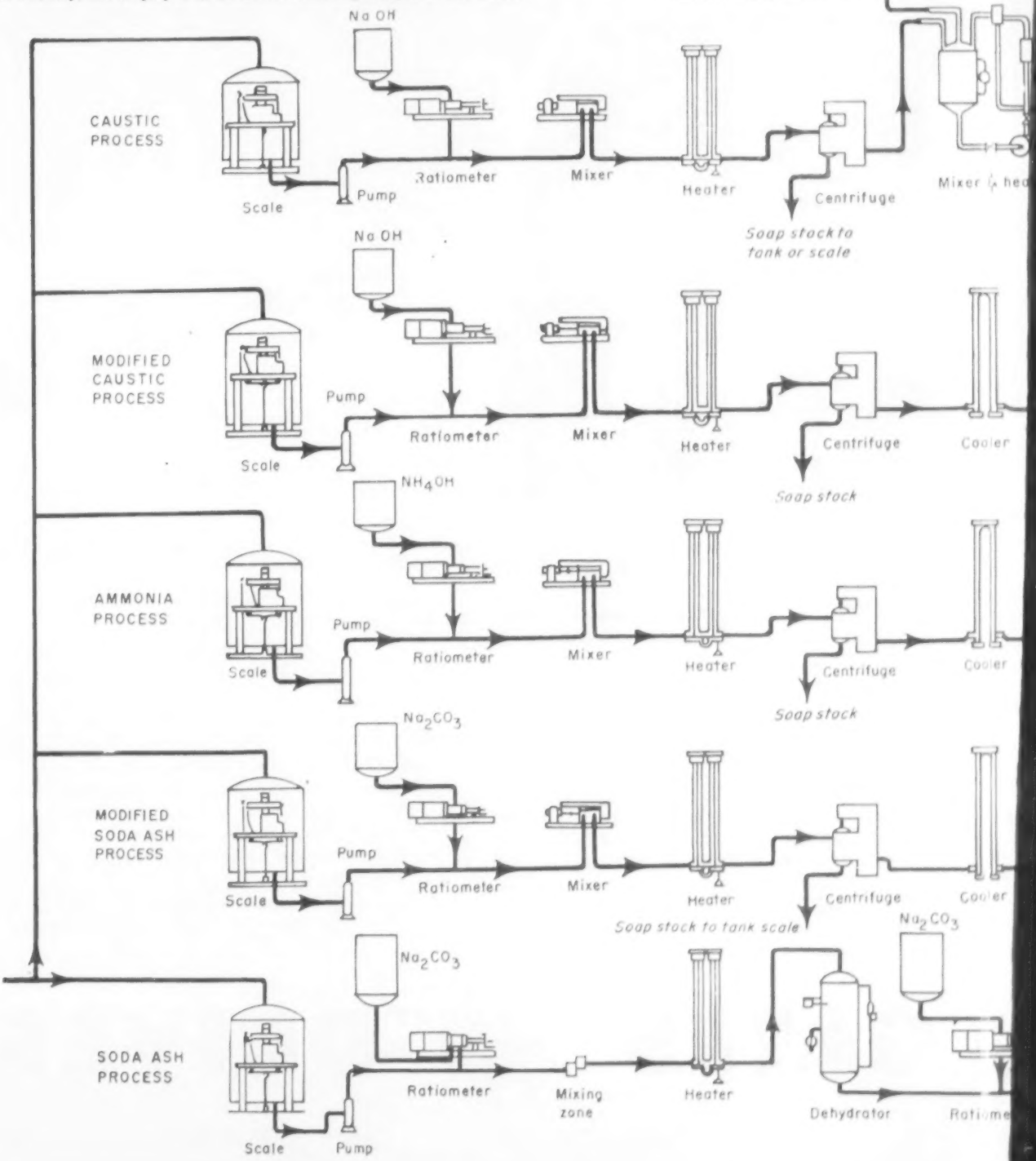


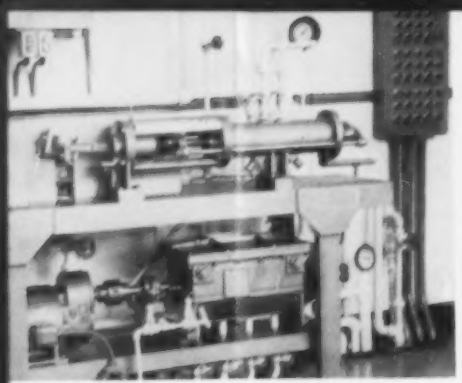
UNFOLD HERE

SCALE TANKS, alternately filled with oil that is weighed and pumped through the refinery, are employed to determine starting weight of day's run.

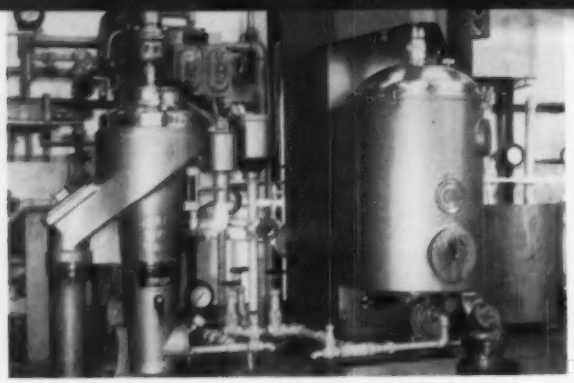


PROPORTIONING DEVICE is employed to mea wherever needed—into any of the oil refining pr



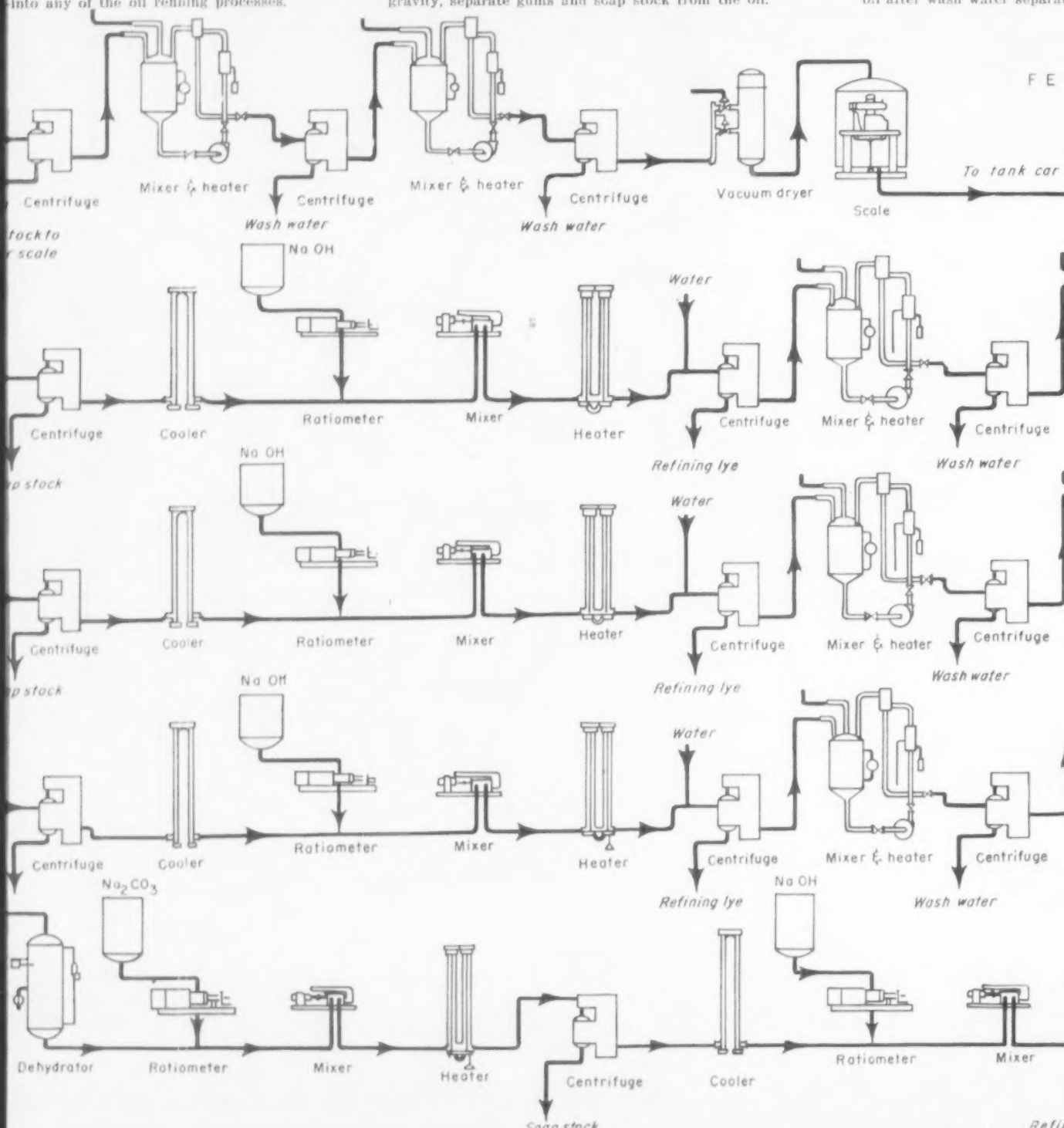


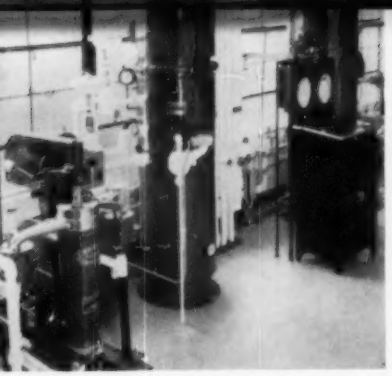
DEVICE is employed to measure reagents—into any of the oil refining processes.



CENTRIFUGES, exerting a force as much as 16,000 times gravity, separate gums and soap stock from the oil.

VACUUM DRYER (center) oil after wash water separat

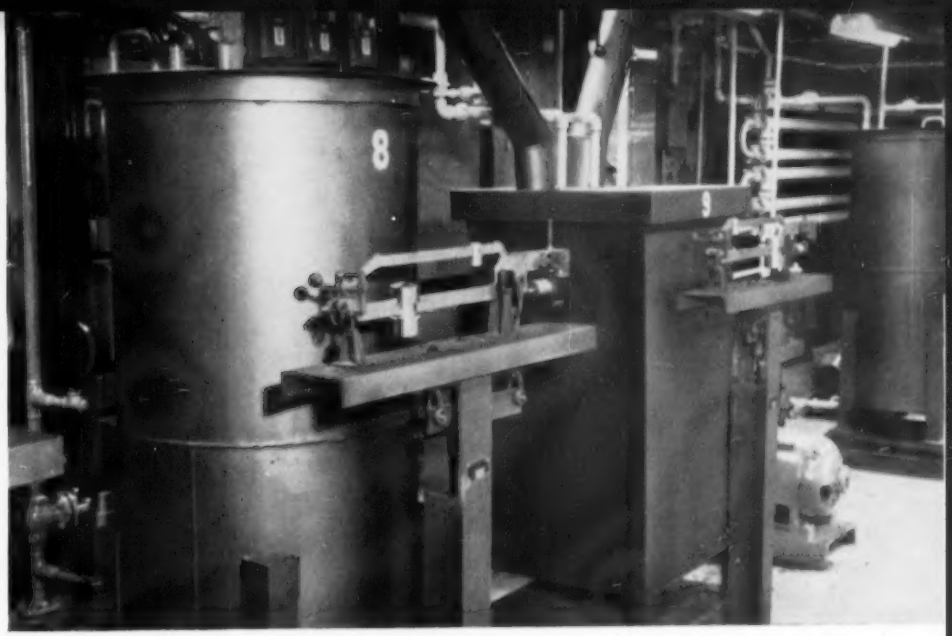




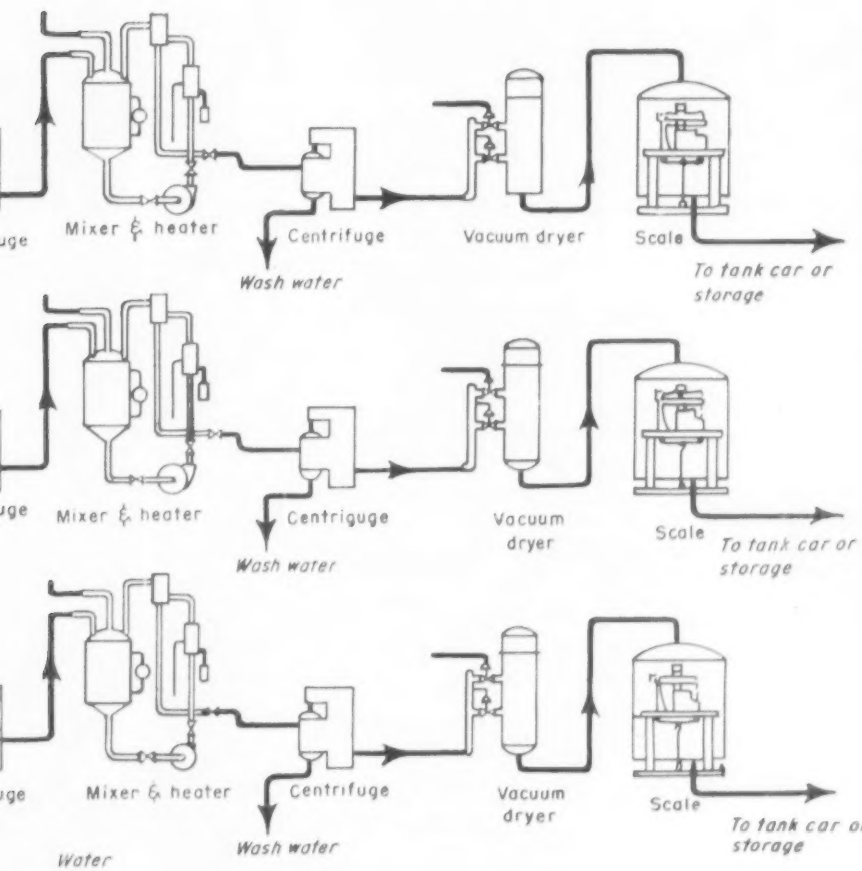
ater) removes last trace of moisture from
paration by centrifuges (right).

F E PICTURE FLOWSHEET NO. 77

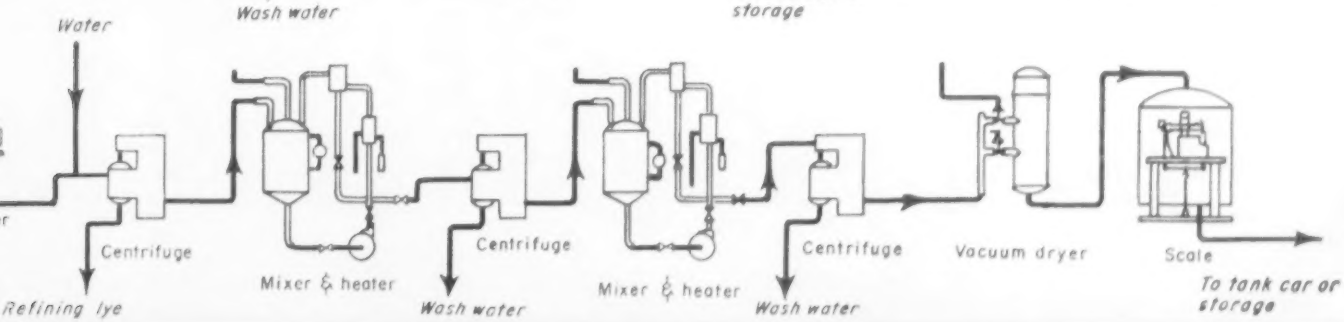
car or storage



TO BATTERIES of weigh tanks can be distributed all products of centrifugal separations—thus providing means of accurate commercial-scale determinations of processing.



LABORATORY FACILITIES provide means for determining process and checking results.



Most Modern Food Trucks On the Menu!

Never have Pickup trucks been so made-to-order for your business. Chevrolet even puts styling to work for you—so distinctively different that it becomes a profitable advertisement-on-wheels for you and your business.

New High-Voltage Engines. Chevrolet's new Task-Force engines are all sparked by a new 12-volt electrical system. And what a difference this big double punch makes!

You get those sure, quick, economical starts. Even on the coldest days. Next you'll feel the big new wallop of action you get in every mile you go. Chevrolet's new high-voltage power goes to work the instant your foot gives the command to the throttle!

You'll agree there's nothing like it, especially when you see how much on-the-go economy there is in these new Task-Force engines. For when you put High-Voltage and High-Compression together, as Chevrolet does this year, you've got the savingest engines in the stop-and-go field. And with Chevrolet's New Overdrive* or no-shift Truck Hydra-Matic*, you'll save even more time and money.

New Suspension Systems—front and rear. Over city streets or country roads. Chevrolet's long, durable springs, newly spaced, make it far easier on both driver and load. Safer too, with the blow-out protection of Tubeless Tires at no extra cost on half-ton models.

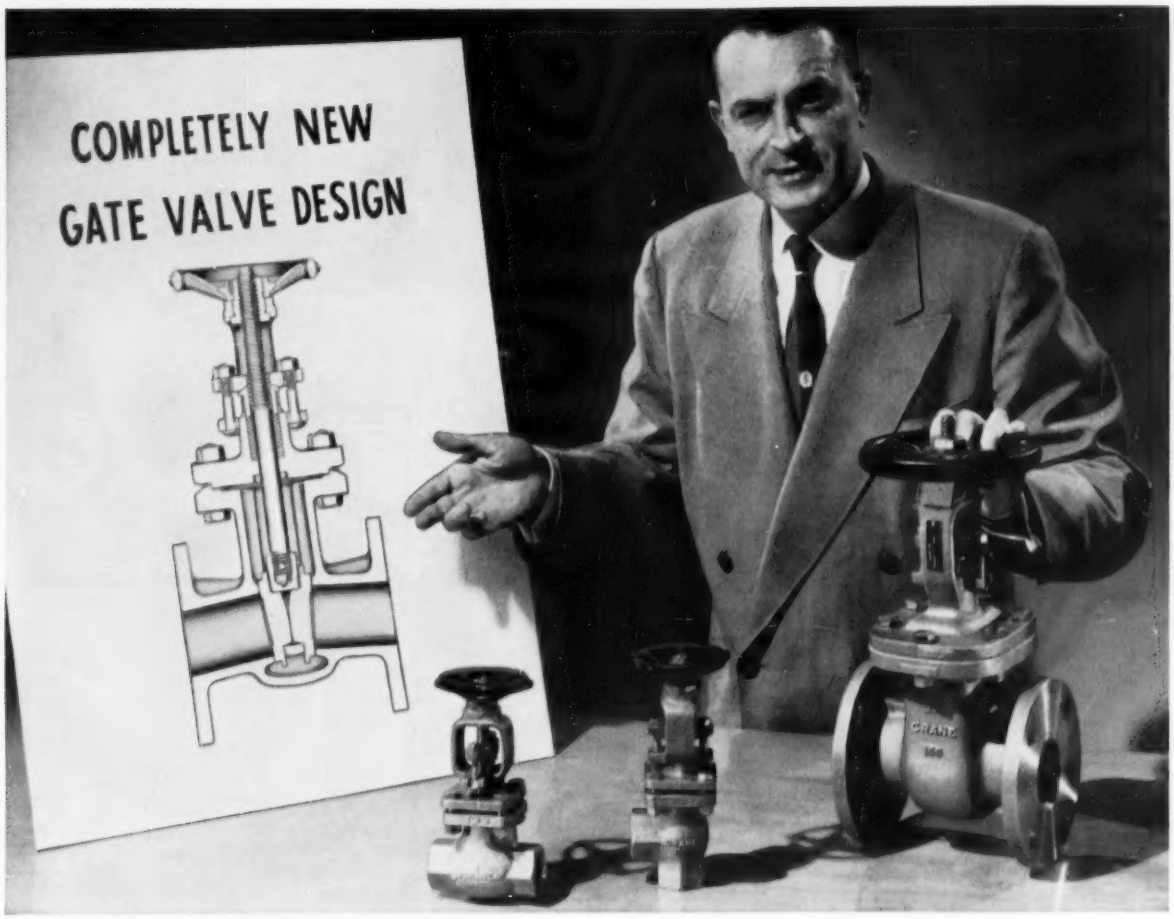
Frames are new, more rigid. More than ever Chevrolet trucks are built to take it. And take it longer. For with their new ladder-type frame construction and full-length parallel side members, you get extra strength without the burden of extra weight.

On and on—completely new. There's new High-Level Ventilation for better air circulation in all kinds of weather; new linkage-type Power Steering* for added driving ease and safety; new Power Brakes* that stop with up to one-third less pedal pressure—and do it right now!

Don't stop here. The rest of the "all-new" story is equally great. So see your Chevrolet dealer. Be sure to ask about his trade-in deal too. Makes good listening for buying today. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Optional at extra cost. Overdrive available on ½-ton models. Truck Hydra-Matic on ½-, ¾-, and 1-ton models. Power Brakes standard on 2-ton models, optional on all others. Power Steering available on all except Forward-Control models.*

NEW CHEVROLET CHEVROLET *Task-Force* TRUCKS



New CRANE Corrosion-resistant valves in 18-8 SMo and Craneloy 20

Gate, Globe, Angle and Check Patterns

Few valves for process industries have ever received the quality treatment given this new Crane line—at prices you'll find O.K.

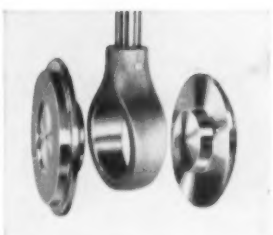
Note, for instance, the unique yet simple split-wedge disc construction in the gate valves. Those dual identical discs are free to rotate in their holder—the most effective design for resisting galling. The trunnion shape at the back of each disc assures even distribution of closing forces. You couldn't buckle them if you tried.

The globe and angle valves give equally outstanding control of corrosive fluids. A new type disc-stem connection, with minimum clearances, practically eliminates vibration. By placing seating load closer to seats, it provides easier, more accurate closure.

Check valves feature compact, thoroughly proved, non-slamming design.

Throughout, these valves are built for better service in your choice of Crane 18-8 SMo Stainless Steel or Craneloy 20. Both lines come with screwed or flanged ends.

ASK FOR THIS CATALOG—Full information including service suggestions given in circular AD-2080—available from your Crane Representative or by mail. Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers everywhere.



New split-wedge disc in gate valves combines the benefits of free rotation with uniform seat load pressure.

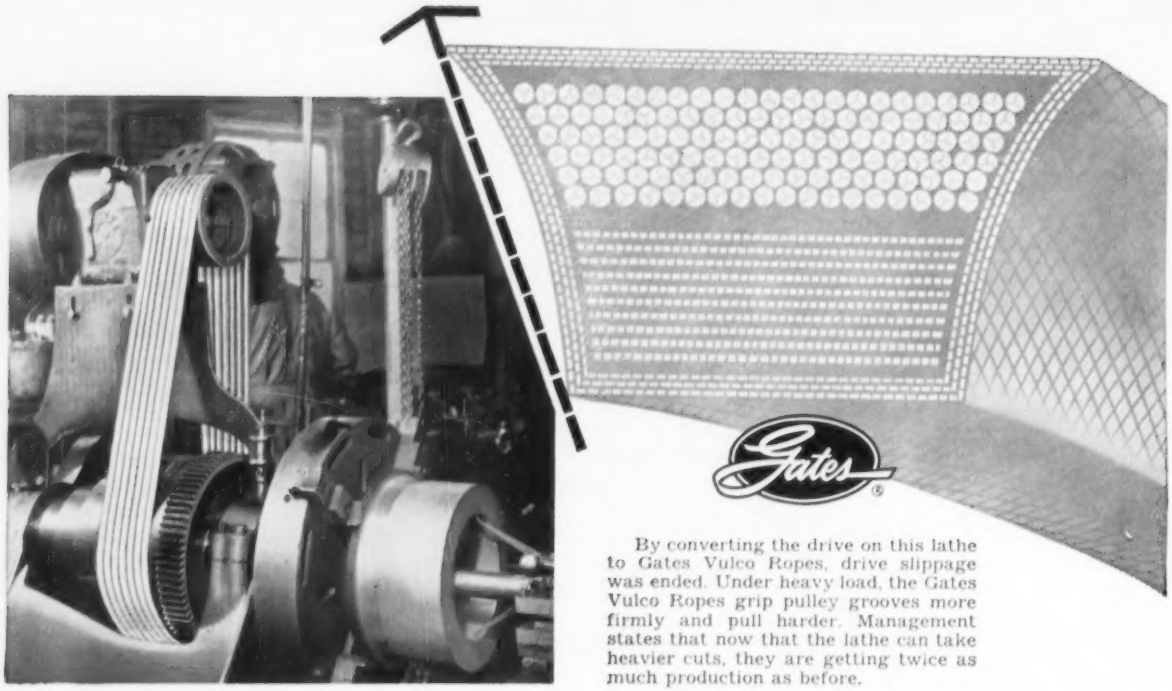
CRANE CO.

VALVES · FITTINGS · PIPE
KITCHENS · PLUMBING · HEATING

CRANE'S FIRST CENTURY...1855-1955

For more information, use coupon on last page.

"Secret" of *lower* belt costs is concave sides



By converting the drive on this lathe to Gates Vulco Ropes, drive slippage was ended. Under heavy load, the Gates Vulco Ropes grip pulley grooves more firmly and pull harder. Management states that now that the lathe can take heavier cuts, they are getting twice as much production as before.

Plants that keep track of costs on drives know this: they get longer wear at *lower cost per year of service* when they specify Gates Vulco Ropes—the V-Belts with *concave sides.*

Here's WHY concave sides keep belt costs down:

When the Gates belt is bent around the sheave, the *precisely engineered* concave sides (Fig. 1) fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley.

This full, uniform contact assures *even distribution of wear.* Naturally, *even wear* means *longer wear.* And longer wear cuts belt replacement costs...reduces down time...contributes to profits.

Prove to yourself the value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. You see immediately that the bulging sides prevent an even fit in the pulley groove (Fig. 2-A). Uneven contact causes faster wear...increases belt replacement costs.

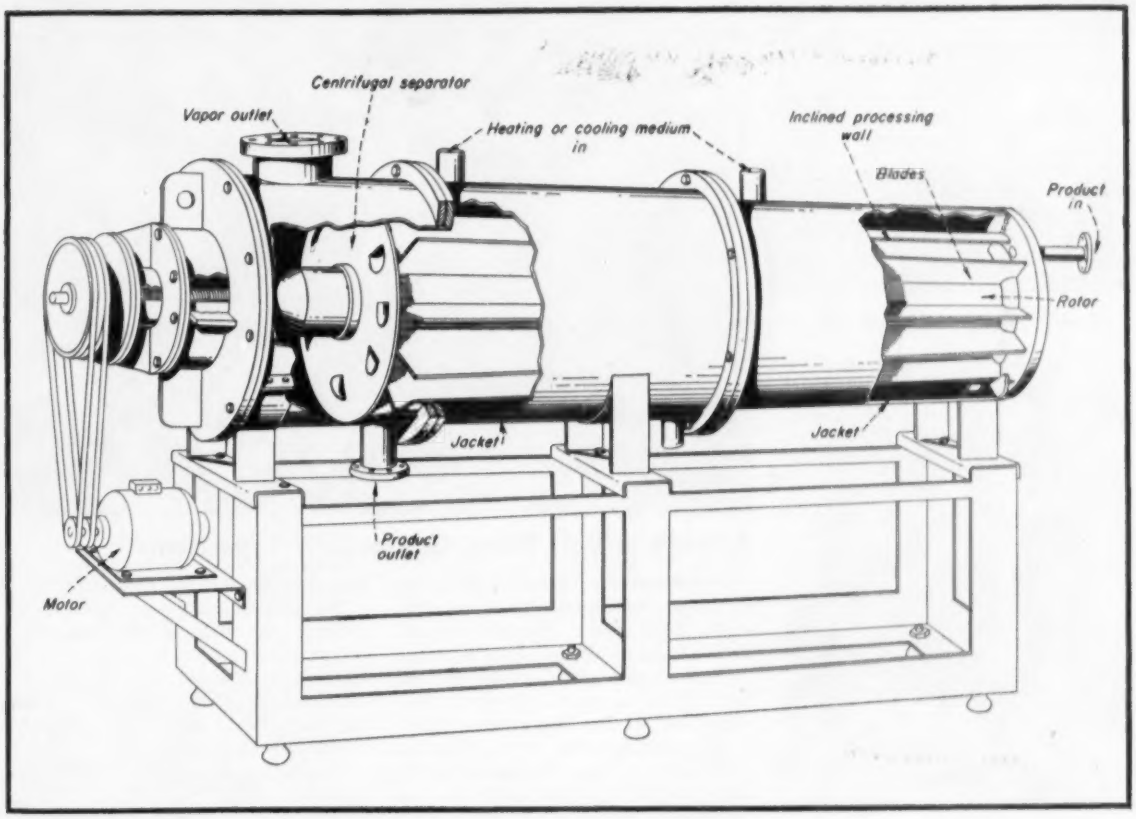
Reduce costs and down time for belt replacements—specify Gates Vulco Rope Drives—the V-Belt with *concave sides* (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 46-A

GATES VULCO ROPE DRIVES

NEW EQUIPMENT & SUPPLIES



New Heat-Exchanger Offers Film-Thickness Control

This single-pass heat-exchanger has a unique film-thickness adjusting device designed to permit: (1) Rapid, high-ratio concentration of heat-sensitive or foamy materials; (2) heating and cooling of viscous products; and (3) special applications such as steam stripping and deodorizing.

Called Adjust-O-Film, it operates on the turbulent, thin-film principle for continuous and automatic processing under vacuum (or gas pressure), as well as at high temperature. Constant agitation of the product film speeds heat-transfer and prevents "burn on."

As shown in the cutaway, the exchanger consists of a horizontal jacketed shell with motor-driven shaft and blades. Latter clear an inclined processing wall by about $\frac{1}{32}$ in. Therefore, film thickness may be varied by advancing or retracting the rotor horizontally within the chamber. This controls residence time-at-temperature while maintaining high turbulence.

In operation, feed is immediately whirled against the inclined wall and kept in an agitated, thin film by centrifugal action of the blades. In moving "down hill" toward the product outlet, it is processed by hot water, steam, Dowtherm, or coolant in the jacket. Vapors pass (concurrent with product flow) through a centrifugal separator, where any entrainment is removed, then to the vapor outlet. For steam stripping, however, vapor flow may be countercurrent.

A similar procedure is used in an "up hill" model in which product moves in the opposite direction—toward the smaller end of the chamber. In this case, a constant increase in pressure acts to keep space between blade tip and wall full of material. Consequently, through-put time can be varied within wide limits by regulating clearance and feed rate.

Units are available in most corrosion-resistant metals and in several sizes from about 300 lb. per hr. to several thousand. They are termed inexpensive to install and occupy comparatively little floor space. Furthermore, cleaning is relatively easy.—*Kontro Co., North Main St., Petersham, Mass.*

Circle 125A on Reader Service Card

Coating Mix Improved By Synthetic Wax

Now available in convenient pellet-form is a synthetic polyethylene wax that eases handling, accelerates melting down, and upgrades paraffin—a basic ingredient of melt coatings used on milk cartons and bread wraps.

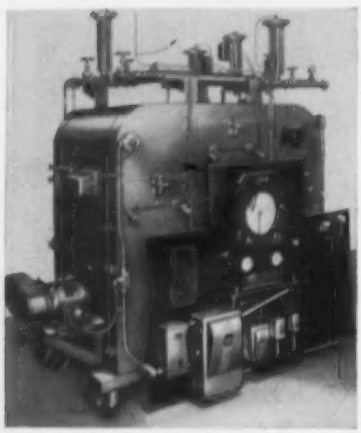
Material is offered in two forms—an emulsifiable type known as "Epolene-E," and a non-emulsifiable type called "Epolene-N."

When latter is used in food packaging mixtures of basic paraffin for coatings, it increases: Block resistance,

hardness, melting point, flexibility, and resistance to moisture-vapor transmission.

Another significant advantage is convenient size. Normally, waxes are handled either in large blocks weighing 10 to 12 lb., or in broken slabs. These generally reach the user in 200 lb. units. However, this material is packaged in easily handled 50-lb. paper bags. Furthermore, small-size pellets reduce melting time.—*Eastman Chemical Products, 260 Madison Ave., New York City.*

Circle 125B on Reader Service Card



Plant Drying-Routine Set In Flexible Lab Unit

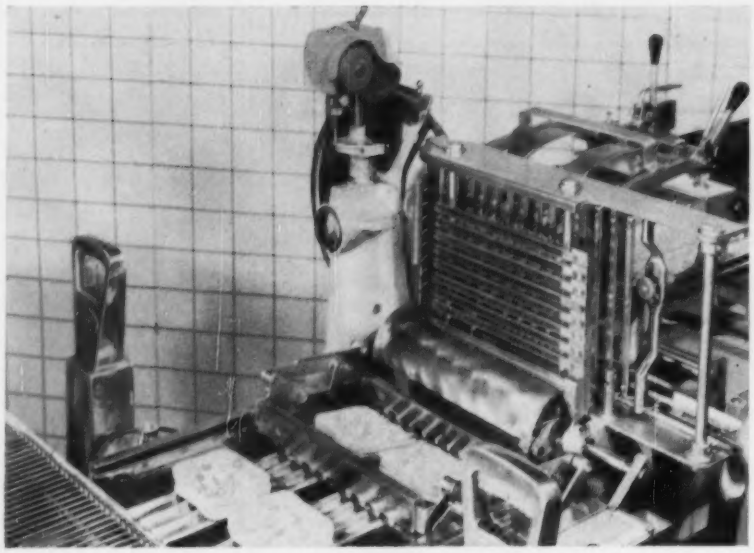
Fully instrumented to reproduce all drying conditions met in the plant, this portable dryer is termed ready to operate after air, steam and electrical connections are made.

Test material may be arranged in trays, suspended from poles, or handled on rolls. Drying variable—temperature, air volume and velocity, steam pressure, and relative humidity—can be automatically or manually controlled, and any one phase of the drying cycle may be changed without disturbing others.

Dryer operates with 40 to 150-lb. steam to heat air stream up to 300 F. Or air can be electrically heated to 500 F. Recommended air pressure to instruments is 20 psi., consumption is 1.2 cu. ft. per min. Charts usually are set for 24-hr. revolution, and both wet and dry bulb controls have sensitivity adjustments.

Dimensions: 8 ft. 6 in. high, 8 ft. wide, and 6 ft. 7 in. deep.—*C. G. Sargent's Sons Corp., Graniteville, Mass.*

Circle 126A on Reader Service Card



Automatic Unit Slices, Groups Loaf-Type Items

Developed for increased flexibility in pre-packing operations is an automatic food slicer (Model 170-SS) with a capacity of 100 slices per min.

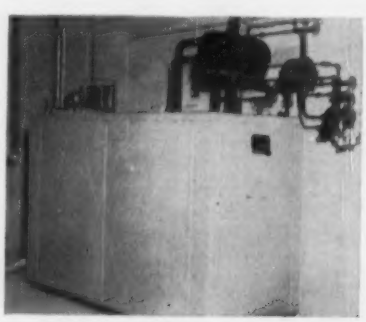
Typical products handled include loaf luncheon meats, bologna, thuringer, and cheese. Balanced operation is said to achieve maximum efficiency.

Operator sets a micrometer thickness- control gage and count control for the particular product. Loaves are placed on meat table, automatically set to the knife, sliced and accurately stacked in groups of desired number of slices. A pusher discharges completed groups to over-and-under scales, and then to a stainless steel wire conveyor. If product is to be inserted into bags directly, optional mandrels are available for vacuum packaging of products in flexible bags.

Number of slices per group can instantly be changed while machine is operating by resetting the count-control switch. Precise stacking is obtained by a new type of fly hand that incorporates tiny rubber-mounted needles on fly fingers.

About ten seconds are allowed to correct stacks to exact weight. However, maker states that with products of uniform size and density, over 85% of these groups need no correction. Therefore, unit is termed particularly suited to a battery setup, in which one operator at the weighing station can supervise two scales.—*U. S. Slicing Machine Co., 231 Berkel Bldg., LaPorte, Ind.*

Circle 126B on Reader Service Card



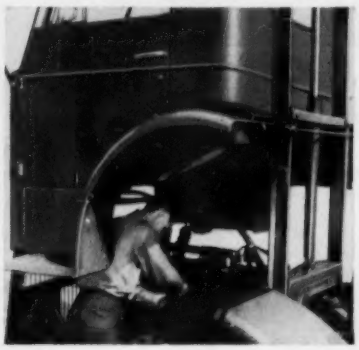
Agitation Ups Efficiency Of Novel Water Cooler

To meet the problem of widely fluctuating refrigeration loads in product cooling and air conditioning, this ice builder is designed to provide continuous supply of 32-33 F. water.

Called "Air-Agitated", it has a unique operating principle. Unit has no baffles for water to channel around in melting stored ice. Rather, it employs free air at low pressure for agitating warm return water about the entire ice field. This results in even melting and efficient heat-transfer. Temperatures below 32 F. may also be obtained by adding alcohol or some other substance to the water to lower the freezing point.

Capacities range from 1,000 to 55,000 lb. of stored ice. Either ammonia or Freon may be used as refrigerant, and units are available fully insulated or as uninsulated models to be finished by the user.—*Tom Lockerbie, Inc., 238 N. Genesee St., Utica, N. Y.*

Circle 126C on Reader Service Card



More Capacity, Driver Comfort and Safety Mark '55 Trucks

A novel cab-over-engine truck series, designed for compactness, has a cab that power-lifts vertically from the chassis for easy servicing. Designated as Verti-Lift D, units are built in sizes from 20,000 to 28,000 lb. gross vehicle weight, and as tractors in the 40,000 to 53,000 lb. gross combination weight range.—*Mack Trucks, Inc., 350 Fifth Ave., New York 1.*

Circle 127A on Reader Service Card

Lower cab floor on "Low Cab Forward" line is designed to enable convenient entrance and exit, as well as easier servicing. Cab floor is now flat, and outside assist handles are no longer necessary. Series includes 75 models on 15 wheelbases to meet the specialized demands of modern traffic conditions.—*Chevrolet Motor Div., General Motors Corp., Detroit 2.*

Circle 127B on Reader Service Card

Engines with 12 horsepower ratings (103 to 202) power this C-3 line, which features improvements to reduce hauling costs and to increase driver comfort and safety. Maximum gross vehicle weights range from 4,250 to 40,000 lb., gross combination weights range up to 60,000 lb. Acoustical headlining absorbs noise.—*Dodge Div., Chrysler Corp., Detroit 31.*

Circle 127C on Reader Service Card

Vacuum Sealer Provides Fast, Automatic Action

Designed to handle both flat and chunk-size meat packages simultaneously, this new vacuum packing machine (Vac-U-Pak) is said to reduce time and energy factors involved in manual loading. And no changeover is required for items of different shape.

Unit incorporates latest safety devices, and takes four packages per 6-sec. cycle when recommended vacuum equipment is used. Operation is simple:

First, the vacuum pump is started and main switch is turned on. This causes the head to open. Then, unit's electrically heated sealing strips require about 15 min. to reach operating temperature. When strips are hot, machine is loaded with four bags.

After loading, operator pushes two conveniently located buttons to begin the sealing process. By requiring that the operator push two spaced-apart buttons, this safety device assures that both hands are outside the machine at the start of operation. A white pilot light then glows to indicate that the unit has taken over and will operate automatically thereafter.

Vacuum is pulled, bags are sealed, and the head returns to open position. Since there are no obstructions in the unit's base plate, packages may be removed with one sweep and placed into a container alongside the machine. Cycle is then complete, and sealer is ready for another load.

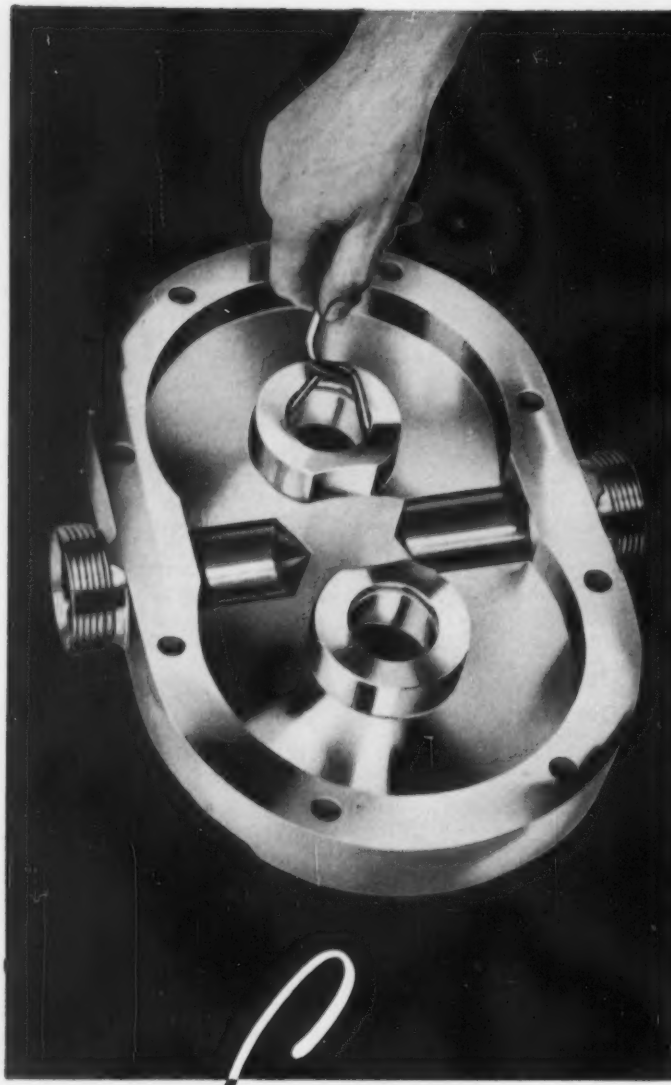
With this equipment, a single operator can handle two machines running alternately. The conveyor that supplies meat to be packaged is placed directly in front of the unit and just below the two control buttons. When two sealers are operating, loading of one machine is accomplished while the other one is packaging. Thus, operator has only to lift four packages from the belt to the machine—a distance of 18 to 24 in.—and press two buttons.

Unit is powered by ordinary house current and no installation is required. It occupies a floor space of 24 in. x 34 in., plus that needed to house the vacuum pump. Latter is piped directly to the machine and no receiver is necessary. Recommended pump motor is 5 hp.—*J. A. Jenks Co., 224 Commercial St., San Francisco 11.*

Circle 127D on Reader Service Card

Mechanical Wall-Washer Speeds Maintenance

This machine is said to cut washing time and eliminate streaking, dripping, and drop cloths. Thus, one operator can clean 3,000 to 5,000 sq. ft. of wall surface daily.



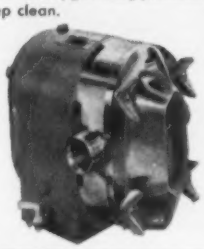
WHY THE WAUKESHA P.D.* SANITARY PUMP?

Easy To Disassemble and Reassemble — A minimum number of parts.

Easy To Clean . . . Wash . . . Sterilize—Smooth, polished surfaces. No cracks or crevices for bacteria to form. No hard-to-clean recesses.

Exclusive Waukesha Sanitary O-Ring Seal Smooth surfaced. Easy to clean. Flips out at touch of a simple ingenious tool. Seals out air . . . seals product in . . . no leakage!

Corrosion-Resistant Metal . . . No Product Contamination—The right metal for the product being pumped. Also, gleaming polished exterior . . . easy to keep clean.



*Positive Displacement

WHAT IS A Sanitary PUMP?

Answer—A sanitary pump is one—that is easy to clean . . . sterilize . . . easy to keep clean, inside and out—in which the metal will not contaminate the product.

Who has it?—Waukesha Foundry Company.

Why select Waukesha?—With a Waukesha sanitary pump—you reduce pump cleaning time . . . reduce plant operating expenses—you are using a pump designed to meet the demands of good sanitary practices . . . meet sanitary code standards.

Besides, not only is the Waukesha pump a sanitary pump . . . it is P.D.*, too! The positive displacement action provides smooth product flow . . . without damage to the product . . . without aeration . . . without turbulence.

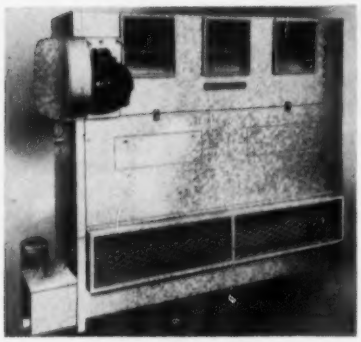
So whenever you need a QUALITY P.D. Sanitary Pump—remember Waukesha—and the exclusive sanitary O-Ring Seal! Many satisfied users attest to its fine performance. For complete details, write to the Waukesha Foundry Company, Dept. 6A, Waukesha, Wisconsin.

Waukesha Foundry Company

WAUKESHA—the Forward Look in Pumps. Yesterday, Waukesha Pioneered the Sanitary P.D. Pump. Today, Waukesha Pioneers the Improvements.

Known as Wallmaster, it is designed to wash, rinse, and dry all types of interior surfaces. Special cleaner (and rinse water) are applied with large light-weight trowels, covered with heavy-weight terry cloth pads. Operation is entirely mechanical—cleaner and rinse are fed into trowels by fingertip control from pressure tanks.—*Quaker Maintenance Co., 124 W. 18th St., New York City, 11.*

Circle 127E on Reader Service Card



Compact Cooling Tower Cuts Water Cost

High water-saving efficiency—up to 97%—is offered in a new line of cooling towers that have capacities of 15 to 100 tons at 75 deg. wet bulb temperature.

In these units, called Flow-Mizer, centrifugal blowers induce quiet, constant air flow with ample capacity for use with ductwork. Wetted metal-deck principle of water-to-air heat transfer is used to deliver maximum cooling capacity in minimum space. All-metal towers are compact for their ratings and require little pack-surface maintenance, since there is nothing to rot, clog, or corrode.

With the sump outside the tower, servicing is said to be easy and convenient. Sump cover is simply removed to expose a water treatment basket, a sediment screen that is removable and quickly cleaned, and a combination waste-drain-and-overflow fitting.

Hot-dip galvanizing after fabrication provides a scratch and corrosion-resistant finish on all sections of the tower, including blowers. Other features: Large convenient access doors, flush-type and splash-proof air inlets, and integrally-mounted, bronze-fitted pumps.—*Acme Industries, Inc., Jackson, Mich.*

Circle 129A on Reader Service Card

New Materials, Method Cut Floor-Resurfacing Cost

Repairing or resurfacing concrete floors—usually an expensive and time-consuming job—reportedly can now be done over a weekend by plant maintenance men, thus avoiding shutdown. Use of two new products makes it possible to lay a floor that withstands abrasion and industrial spillage.

First of these materials is a brush-applied plastic that forms a strong bond between the new flooring and the old. Called "Inlaycrete Bond," it is a combination of plastic and latex which is termed non-oxidizing, non-aging, and has permanent bonding qualities.

Second product is the actual floor-surfacing substance (Inlaycrete), which is made of finely crushed quartz reinforced with iron particles. This material is dense, hard, and non-dusting. Floors surfaced with it are said to stand heavy traffic even when continuously covered with water, and to last 3 to 5 times longer than ordinary floors.

A typical application (in a cottage cheese room) shows the procedure for covering 300 sq. ft. of floor. Time and labor are saved at the outset because this method eliminates hammering or chiseling to insure a good bond. Cost of roughening with an air hammer is 25¢ per sq. ft. against a labor and material cost of 8¢ by the new method.

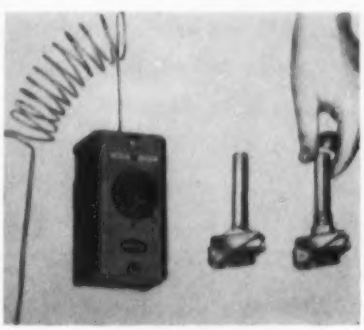
Floor is first cleaned with a strong caustic solution (left) and thoroughly flushed with clear water. Then 5 gal. of bonding material is applied with a roofing brush (right). Entire job is completed in 30 min. late on a Friday afternoon.

Resurfacing starts the next morning. A mechanical mixer (or a mortar box) is used to prepare batches of material in amounts that can be laid in 20 min. Wooden depth strips ⅜-in. thick by 1½-in wide, and 6 to 10 ft. long are used to lay large areas. Or flat irons can be used.

Surfacing is raked out to a 1½-in. thickness and leveled. Then it's well tamped and smoothed with a trowel. A second troweling is given after the surface is hard enough so that material does not accumulate on the trowel. This burnishing gives a hard, dense finish. Proper set and curing can be obtained with a curing compound or by applying wet burlap for a 24-hr. period.

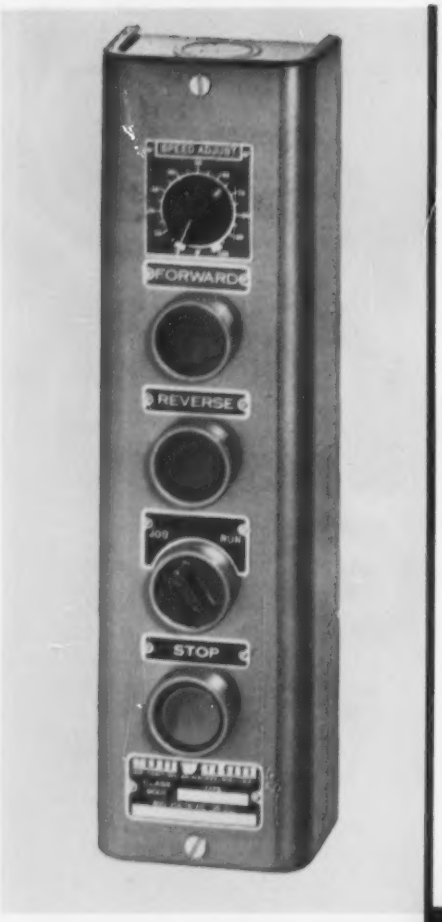
Floor is finished on Saturday afternoon, and by Monday morning, the surface has set and is ready for heavy industrial traffic.—*Garland Co., 3748 E. 91 St., Cleveland.*

Circle 129B on Reader Service Card



Snap-Action Thermostats Have High Load Rating

Heavy-duty load-carrying capacity and small differential are combined in a new series of liquid-filled, snap-action type thermostats. Units are recommended for applications where ability of thermostat to carry heavy electrical loads (20 to 35 amp.) without relay is more advantageous than



The "Unseen Hand" at the Controls . . .

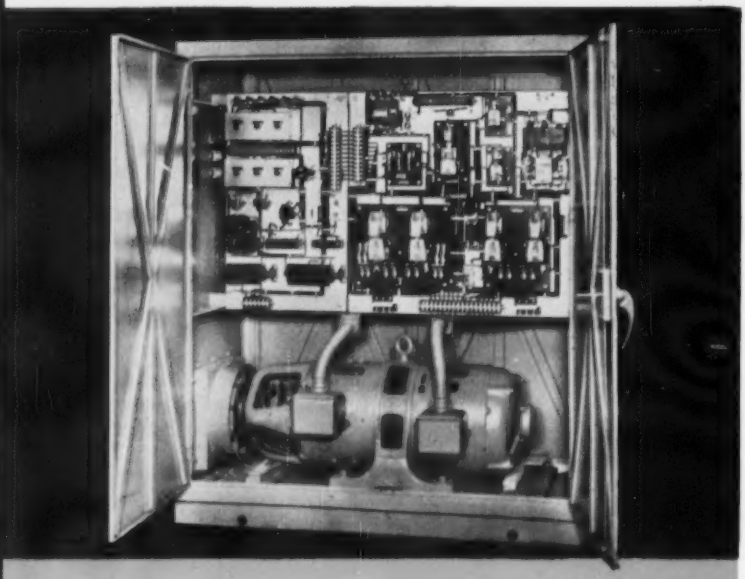
AUTOMATICALLY SENSITIVE

Performance-Rated©

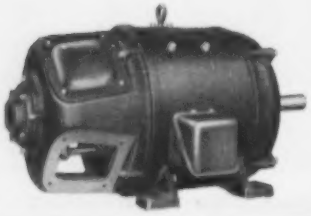
Century

SELECTIVE SPEED DRIVE

More accurately than the most experienced operator, Performance-Rated Century Selective Speed Drives *automatically* adjust motor speed to meet operating requirements. Speed changes are integrated with varying pressure, temperature, viscosity or size of the material being worked. You can also use Century Selective Speed Drives for starts, stops and jogs—forward or reverse—as required.



For full information and assistance on any motor drive application, AC or DC, call your nearest Century Sales Office . . . or write us direct.



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1/8 to 400 H. P.

CENTURY ELECTRIC COMPANY

1806 Pine St., St. Louis 3, Mo. • *Offices and Stock Points in Principal Cities*

the precision temperature response (0.1 deg. F.) of lower load-carrying and slower make-and-break type thermostats.

Two models are available—one for remote installation, and the other for direct installation (local-bulb type). Latter is designed for use over an adjustable range of 50 to 300 F., while the remote unit is available in two ranges—50 to 250 F., and 150 to 550 F. Up to 25 ft. of tubing can be furnished with this model.

Local-bulb thermostat consists essentially of a sealed bellows encased in a liquid-filled outer shell, plus a sensitive snap switch in direct linkage. On temperature rise, liquid expands against the bellows which causes it to trip the snap switch, and thus operate electrical contacts. Since liquid is in direct contact with the outer shell, which has a heat-sensing area of about 10 sq. in., response time and sensing accuracy are termed unusually good. Inherent differential of this unit is 2 to 3 deg. F.

Furthermore, because liquid pressure compresses rather than distends the bellows, maker states that this thermostat can be expected to give long, trouble-free service. And as additional protection to the response mechanism, the snap switch pivots against reaction of a torsion spring which permits the whole assembly to "lift" without damage, if exposed to extreme temperature overshoot.

Local-bulb unit, which has a $\frac{3}{8}$ in. dia. and $3\frac{1}{4}$-in. long sensing leg, is furnished with standard $\frac{1}{4}$-in. pipe thread fitting for easy installation. In the remote model, bulb diameter is about $\frac{1}{4}$ in. and its length is 11 in. Control mechanism is housed in a flanged 3x3x6-in. case which can be mounted conveniently on any flat surface.—*Fenwal, Inc., Ashland, Massachusetts.*

Circle 129C on Reader Service Card

Film-Type Poultry Pouch Has Many Advantages

A new film pouch—an innovation in poultry packaging—offers these significant benefits: (1) Eliminates dunking or shrinking, (2) clings to bird without wrinkling, (3) saves labor and materials, (4) enables birds to go to freezer dry, (5) does not tear or shatter, (6) withstands extreme freezing temperatures, (7) is clear.

Packaging with this material (Mil-O-Film) is cited as a speedy, three-step process—stuffing, evacuating, and tying.

Poultry is placed in pouch by first stretching the bag with a stuffing horn. Bird is then inserted through the horn. As soon as tension on pouch is released, it snaps back and form-fits around the fowl. After the bird is in the pouch and is removed from the stuffing horn, it is ready for vacuum treatment and tie-off.—*Milprint Inc., 4200 N. Holton St., Milwaukee 1.*

Circle 131A on Reader Service Card

New System Combines Truck and Rail Transport

This unique method for transporting freight takes advantage of and smoothly combines the most economical aspects of trucking and railroad transportation. And it is seen effecting important savings in time, manpower, and money.

Called the Clark Mobilvan System, it not only embraces movement of freight, but its storage as well—providing for the first time a mobile warehouse. This flexible shipping method is applicable to either truck or rail transport where one type of carrier is used exclusively, or in combined operations using both.

System is based on use of a lightweight van 17-ft. long, 8-ft. wide, and 8-ft. high. This unit is designed with automatic locking devices that enable it to be fastened securely to the bed of a railroad flatcar, or to the body of a flatbed highway truck, similarly adapted.

Van's 17-ft. length permits loading of three unit on a standard railroad flatcar, which is $53\frac{1}{2}$ ft. long. Two vans may be transported on a conventional 35-ft. highway trailer, and one on a city delivery flatbed truck.

In operation, merchandise is loaded into the van at shipper's loading dock. During loading, van can be either on a flatbed truck trailer, or, if shipper has a fork-lift truck, it can be at ground or floor level. Movements of the van between loading dock and flatcar or trailer can also be accomplished by use of a large straddle carrier (photo, left).

Once loaded, van is hauled to railroad freight terminal, removed from highway truck by a fork-lift truck or straddle carrier and placed aboard railroad flatcar. Or, the container (van) could be carried by truck to a trucking terminal to be combined with another van on a highway trailer for a long overland haul. At the end of its rail journey, it is removed from the flatcar by fork-lift truck or straddle carrier and placed on a flatbed truck for delivery to its final destination (photo, right). Or, depending on volume of goods, van could be left atop the flatbed trailer for final delivery.

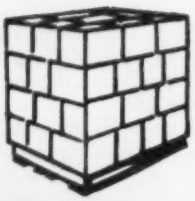
An important advantage of this system is that, following delivery, the van can become a convenient storage structure for contents that are not immediately needed. By contrast, it is economically unfeasible to immobilize a conventional highway trailer for storage purposes.

Each unit is designed for a capacity of 20,000 lb. of freight, and when empty, weighs 3,000 lb. Integral parts of the system are two items of material handling equipment. One is the 30,000-lb. capacity fork-lift truck (Clark Ross), and the other is the straddle carrier (Ross) adapted for this purpose.—*Clark Equipment Co., Buchanan, Mich.*

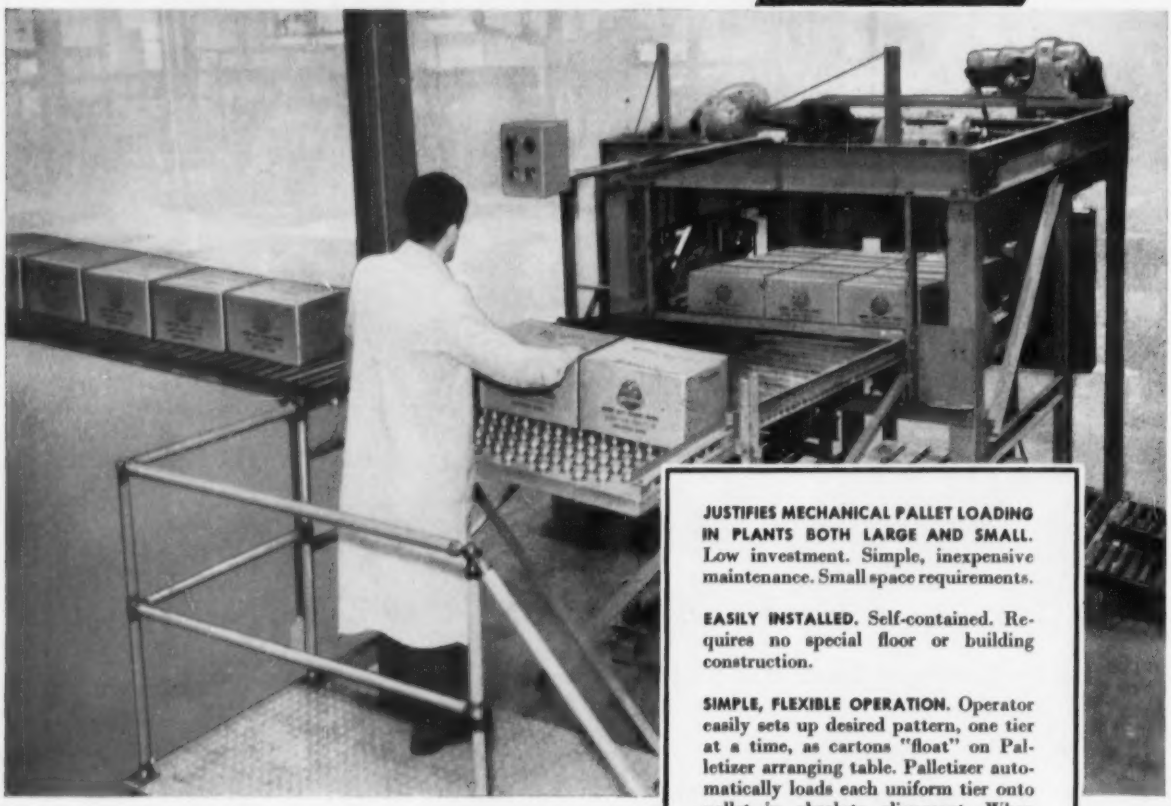
Circle 131B on Reader Service Card

PRESENTING a major advance in fast, safe, economical pallet loading with the

*Palletizer**



LOADING MACHINE by GREER



JUSTIFIES MECHANICAL PALLET LOADING IN PLANTS BOTH LARGE AND SMALL. Low investment. Simple, inexpensive maintenance. Small space requirements.

EASILY INSTALLED. Self-contained. Requires no special floor or building construction.

SIMPLE, FLEXIBLE OPERATION. Operator easily sets up desired pattern, one tier at a time, as cartons "float" on Palletizer arranging table. Palletizer automatically loads each uniform tier onto pallet in absolute alignment. When pre-set number of tiers is reached, loaded pallet automatically discharges and new pallet rolls into loading position.

Number and variation of patterns unlimited. Change patterns and loading rate at will. Adjustable to any standard-size pallet.

HANDLES CORRUGATED CARTONS AND WOODEN BOXES OF ALL TYPES . . . including open-type cases, reusable cases, bottler's cases, stubbies, and others. Also handles unglued flaps.

Now, one man and a Palletizer by Greer can pallet load up to three or more times as many cartons or packages as possible by manual methods alone. Minimizes fatigue — no lifting or stooping. Reduces damage to packages and contents through less handling.

Write today for helpful, informative bulletin and name of your local Palletizer dealer.

J. W. GREER COMPANY

Wilmington, Massachusetts.

PALLETIZERS are sold and serviced by authorized dealers throughout the U.S. and Canada

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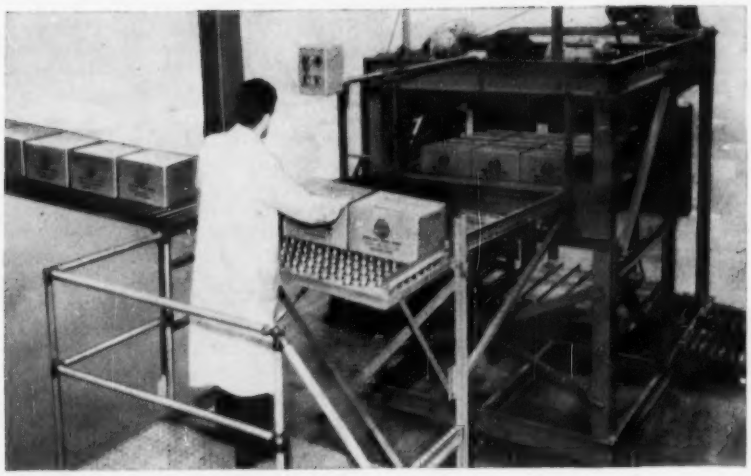
Patent Applied For

GREER



Pallet-Loader Speeds Packaging, Cuts Costs

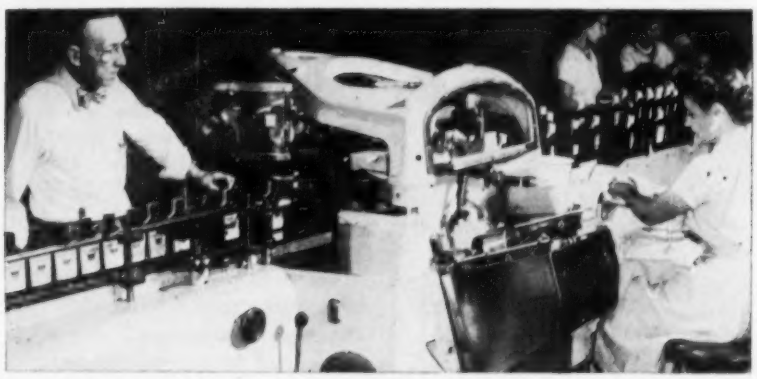
To both large and small plants, this unit now offers economies of mechanical pallet loading.

With this machine (Palletizer), one operator is said to palletize three or more times the number of cartons possible by manual methods alone. Other advantages include minimized handling and less damage to packages. Unit is readily installed without special floor construction, and offers economical maintenance.

In operation, desired pattern is easily set up one tier at a time, without lifting or stooping, as packages "float" on arranging table. Palletizer automatically loads each tier onto pallet as formed. When preset number of tiers is reached, loaded pallet is automatically discharged and new pallet rolls into loading position.

Unit handles pallets ranging from 32 in. to 48 in. square, and combinations thereof. Number and variation of patterns is unlimited and loading rate may be changed at will.—*J. W. Greer Co., Wilmington, Mass.*

Circle 133A on Reader Service Card



Precision Sealer Rapidly Applies Bottle Neck-Bands

Of special interest to wine processors is a new sealer that automatically applies pre-cut cellulose bands to bottle necks at rates up to 140 per min. However, this unit (Salamatic) can easily be adapted to the output of any food product packaged in bottles.

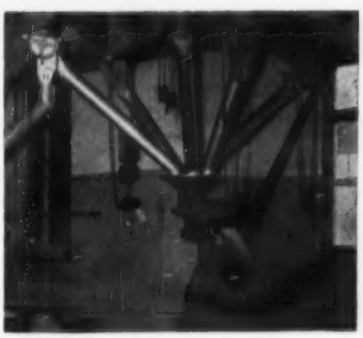
Machine handles round bottles from 6¼ to 13 in. high, and diameters to 4½ in. On flat bottles, widths range to 5 in. and thickness to 4 in., while heights are as above. Cellulose band sizes are to 34 mm. dia., and 85 mm. long. Seals can be located even with the top of the cap or as high as ¼ in. above the cap.

Seals are loaded into magazine trays (900-1,000 bands) while the machine operates and are self-aligning and self-feeding. Loading arms do not pick up seals if bottle supply stops. Bottles follow a semi-circular path with no sharp turns.

Unit can be adjusted to handle bottles of different shape in about 5 min., while a major change can be accomplished in 30 min. Enclosed gear cases, ball and roller bearings, and thorough lubrication provide dependable performance. Saftey features include clear-plastic guards which protect moving parts, and clutches which stop the machine immediately.

Other accessories: Bottle orienter unit for use with extended-lug or indented-lug bottles to provide correct alignment of neck band, and a double-discharge unit that saves floor space and facilitates final packaging.—*Gisholt Mach. Co., Madison 10, Wis.*

Circle 133B on Reader Service Card



High-Speed Hammermill Has Controlled Feed

Increased rotational speed and uniform feed are said to make these Swiss units particularly effective in grinding fibrous and fatty materials.

Known as Moleka-Rex, the mill has two parallel-running rotors that rotate counter to one another at 220 ft. per sec., and six rows of hammers mounted on each rotor. Hammer's impact force is proportional to the square of the speed, which reportedly makes this mill four times as efficient as a single-rotor unit.

Material to be ground is fed from above, then in between the rotors. Product discharges through easily interchangeable sieves which are provided for each rotor housing. And construction of the feed hopper assures that product is not flung back.

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—back of book. Then sign at the bottom and mail.

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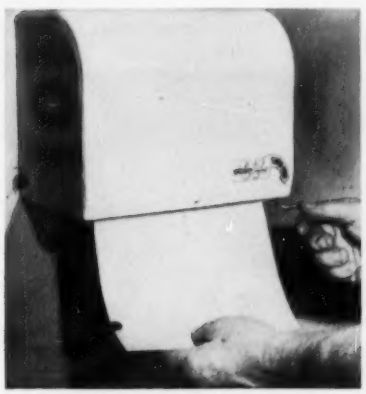
Vibrofeeder unit is coupled to the motor driving the mill through an electronic feedback device. This acts as an overload control on the motor by decreasing the feeder's vibration as motor current increases. Such an arrangement prevents burning out the motor and provides even feeding.

Mill has a cast-iron housing that is protected inside with exchangeable armor plate, and is provided with ball bearings throughout. Large model has an inner housing diameter of 500 mm., while a smaller unit is 308 mm. in dia. Average rotation is 2900 rpm., and the mill can be powered with motors up to 24 hp.

With a 6 hp. motor, the following hourly yields were obtained: corn, 360 lb.; granulated sugar, 1500 lb.; black pepper, 130 lb.; and starch, 250 lb. Yield is directly proportional to motor hp.—*Gericke & Co., Zurich 23, Switzerland.*

Circle 133C on Reader Service Card



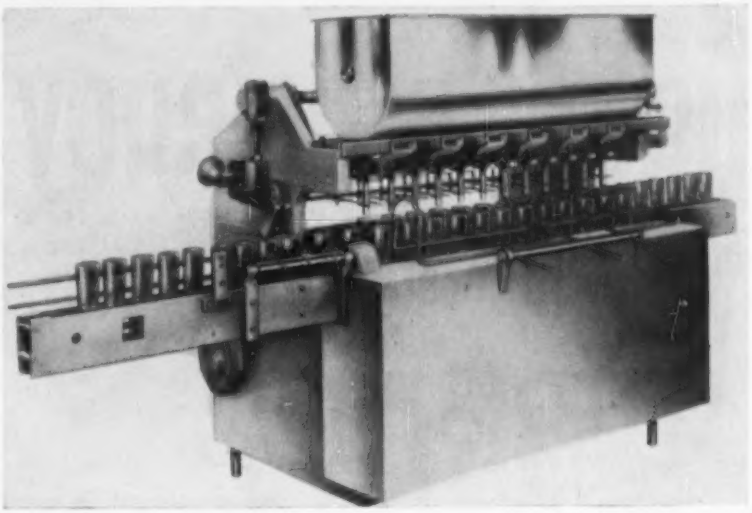
Paper-Towel Dispenser Discourages Waste

Up to 40% of paper-towel expense and 75% of reloading and servicing time reportedly are saved with this crank-operated dispenser, called Westroll.

Continuous paper-toweling is economically metered out by molded nylon wormgears operating in a simplified feed mechanism. This eliminates need for lock-feed timing devices. Furthermore, no adjustments of the feed cycle are necessary, and waste is reduced by crank-action feed control.

Spaced notches along left edge of towels grow closer together as supply is used, thus providing simple indication that replacement is due. Each roll furnishes about 660 sheets.—*West Disinfecting Co., L.I.C., New York.*

Circle 135A on Reader Service Card



Unit Fills Viscous Items Accurately and Fast

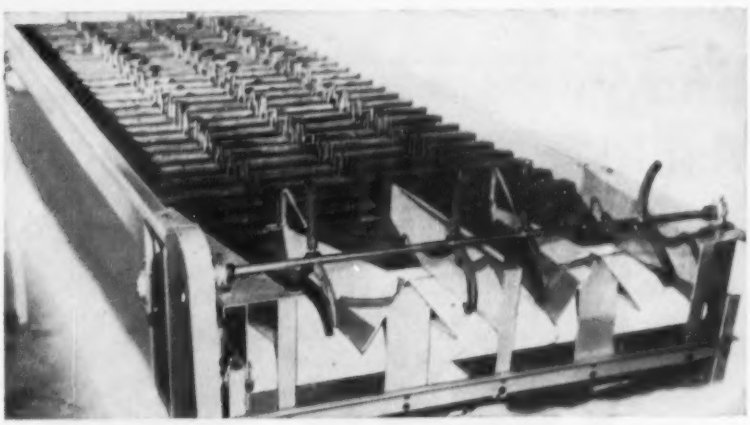
This straight-line, heavily constructed machine is designed to fill products such as jellies, preserves, mayonnaise, salad dressing, and cheese into glass, plastic, or metal containers at rates up to 300 per min.

Its air-operated valves cut off instantly regardless of cycle speed. Thus greater accuracy of fill is provided since valves are air free. Standard equipment also includes a "no-container–no-fill" device which prevents loss of product when containers are not at filling station.

Simplified construction is said to save space, increase efficiency, and lower maintenance costs. All contact parts and parts around filling zone are of stainless steel. Unit is easy to clean, adjust, and change over to different containers and products.

New series (Model SL-55) is available in 4, 6, 8, 10, and 12-line fillers and can be equipped with an air cleaner, unscrambler, and motor-driven agitator. Special jacketed and heated hoppers may also be obtained. —*Filler Machine Co., Philmont Club Station, Pa.*

Circle 135B on Reader Service Card



Wave-Forming Sorting Table Cuts Handling Time

A new type of sorting table, which moves and turns fruit or vegetables with a wave motion, reportedly cuts handling from ⅓ to ¼, depending on the number of grades. As multi-directional turning exposes all sides to the sorter's view, there's no need to pick up fruit—thus fewer operators do the job.

Any medium-size product—avocados, pears, apples, and tomatoes—and even odd shapes, such as "cuke" avocados, are effectively handled. Two or three sorting lanes are available

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In the final analysis, the efficiency of a pump is determined by the volume and pressure of the liquid delivered compared to the electric power consumed. And here are 4 "reasons why" Ingersoll-Rand Motorpumps give you this greater efficiency:

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* For *all* the "reasons why" you get higher efficiency from Ingersoll-Rand Motorpumps in sizes from ¼ to 75 hp, write for our New Motorpump Catalog, Form 7093-E.

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Equipment & Supplies

on each side of the 12-ft. table. With packed-out apples, up to 700 boxes (42 lb.) have been handled per hour.

Fruit is supported by neoprene-covered cross bars spaced ¼ in. apart. Height of each cross bar is such that every five bars form a wave and trough shape 1½ in. deep. But each bar moves only vertically (about 1½ in.). With this motion, bars change relative position in the wave pattern. Result is a wave movement running through the bars to the end of the table.

Produce deposited on the table is automatically positioned in the troughs of the waves, and gently rolled to the discharge end. Only 16 cams are used to actuate the cross bars—a development intended to hold maintenance to a minimum. Speed is easily adjusted in the range of 14 to 37 ft. per min. with no jumping of the fruit.—*John Bean Div., Food Machinery & Chemical Corp., San Jose, Calif.*

Circle 135C on Reader Service Card

New Filling Scale Handles Highly Fluid Powders

This new gross weight scale offers simplified filling of free-flowing powders directly into bags, cans, or drums.

Automatic controls are designed to permit operator to position empty containers and remove filled ones. And further, the feeder can be furnished with a small surge hopper, containing an agitator section, to assure free flow of material.

An important advantage of this scale (Model 700G) is that its leverage system contains no knife-edge pivots, which become dull and inaccurate with use. Instead, levers are provided

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EASY MAINTENANCE is built right in *Duraface* FOAMGLAS. It will withstand greater impacts than cement plaster finishes. Its integral finish can't blister or peel.

Now you can insulate your cooler and freezer walls entirely with glass including the finish on the insulation. You can do it by using a single new product . . . *Duraface* FOAMGLAS. That's Pittsburgh Corning's unique cellular glass insulation fused with a white crust of denser, sealed glass cells.

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This remarkable new product may solve *your* insulating and finish problems! Wouldn't you like to see a sample and get descriptive folder? Please use coupon today.

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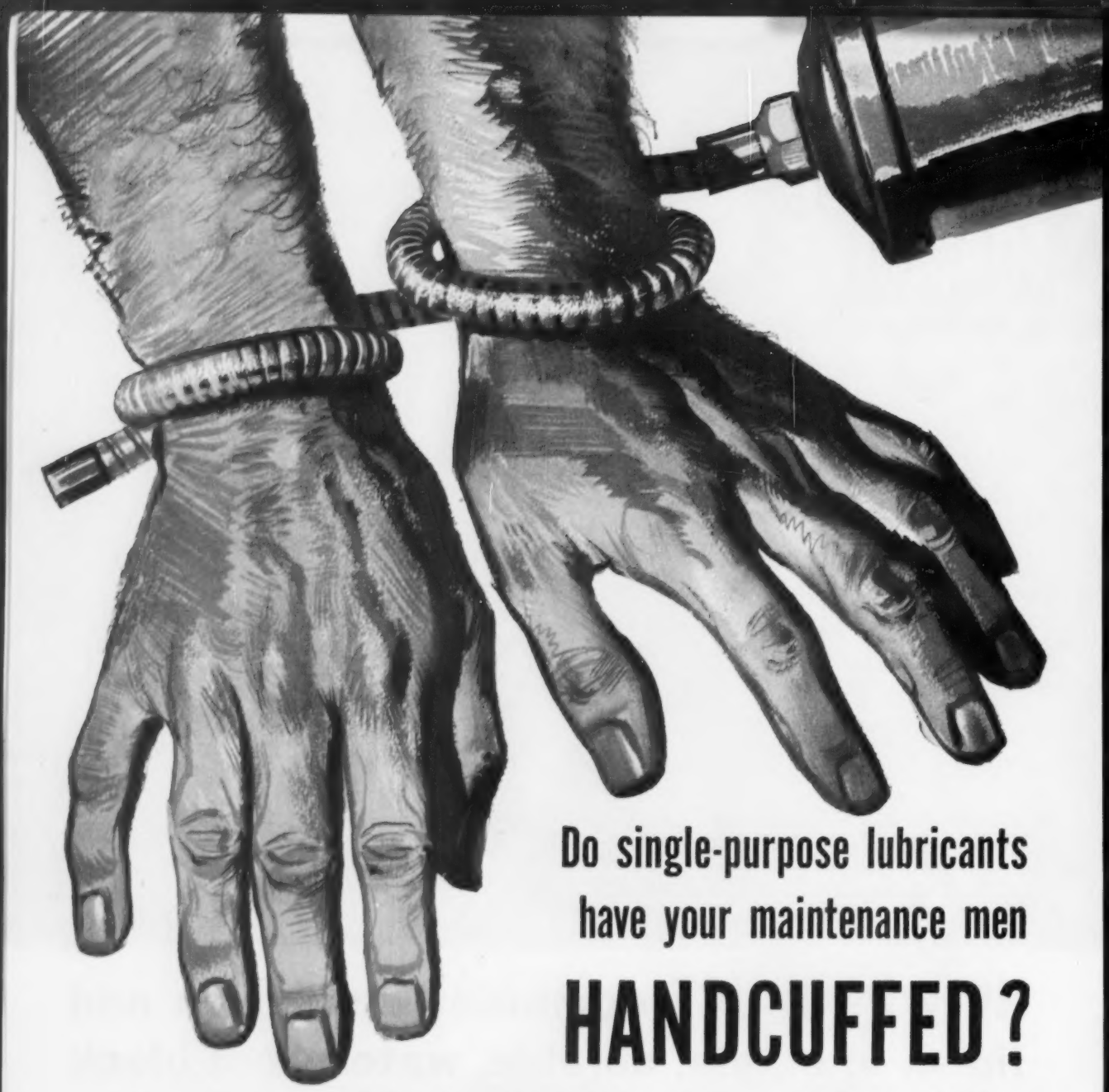


Do single-purpose lubricants have your maintenance men

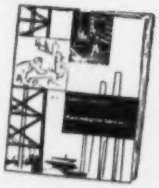
HANDCUFFED?

Cut costs with Pure's "Simplify and Save" Plan

If your lubrication program calls for *many different* oils and greases, it's a safe bet your maintenance men are spending far too many man-hours in application.

Pure Oil has perfected a line of *multi-purpose lubricants* which reduces the number of lubricants to a money-saving *few*. This means faster application . . . fewer errors in application . . . reduced inventory . . . simplified inventory control . . . more efficient purchasing.

Find out how Pure's *multi-purpose* lubricants can cut costs in *your* plant. Reverse the charges to your nearest Pure Oil office today.



FREE BOOKLET tells you "How to Simplify and Save." Write The Pure Oil Company, 35 E. Wacker Drive, Chicago 1, Illinois. (Offer limited to Pure Oil's 24-state market area.)

BE SURE PURE WITH PURE

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PURE MULTI-PURPOSE LUBRICANTS

Sales offices located in more than 500 cities in Pure's marketing area.

with special plates which reportedly retain their sensitivity and accuracy after millions of weighings, regardless of product handled.

Unit can also be furnished as a net weight scale for discharging preweighed loads to storage containers or for batching purposes.

Models are available for filling 1, 2, 5, and 10-lb. bags, and a platform allows same unit to handle cans. And larger scales fill 25, 50, and 100-lb. bags with hard-to-handle items, such as 6X sugar.—*Thayer Scale & Engineering Co., 494 E. Water St., Rockland, Mass.*

Circle 136A on Reader Service Card

Water Softener Features Automatic Regeneration

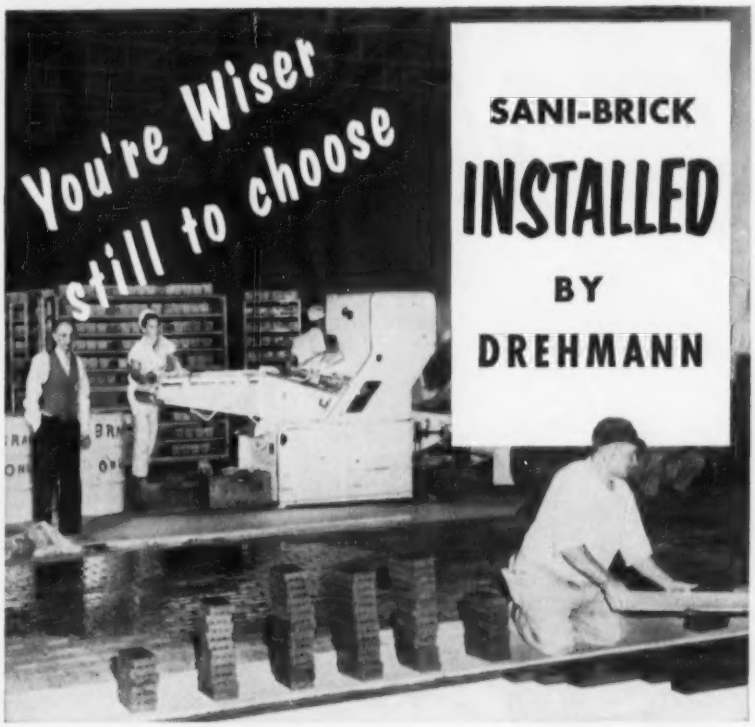
Top-quality soft water—at rates up to 10 gpm.—and automatic regeneration are advantages cited for this new, fully automatic water softener.

A special built-in timing device provides for automatic regeneration one to seven times per week at any predetermined interval. This feature compensates for water of varying hardness. Four-month salt supply is held in a polyethylene brine tank that prevents corrosion and subsequent tank replacement.

Unit occupies a floor space of 14 in. x 28 in., and is 35 in. high. Total weight is about 30 lb. It is shipped completely wired and assembled. Design simplicity is said to make hook-up to water lines rapid.—*Belco Industrial Equipment Division, Paterson, N. J.*

Circle 139A on Reader Service Card

YOU'RE WISE TO CHOOSE **BRICK**



Brick is recognized as the soundest material there is for food processing plant floors. It is handsome in appearance. Has high sanitary properties. Resists acids and alkalies. Costs little to maintain.

To derive these many benefits, however, it is essential the work be done by a contractor of proved capability. The installation of brick, unlike that of other flooring materials, requires specialized engineering and highly skilled workmanship.

Drehmann—originator of brick flooring—is the most experienced flooring contractor in the food field. More than 9,000,000 square feet of Sani-Brick—many of the floors sound as a dollar after 30 years of punishing treatment—is convincing evidence of the long-life, trouble-free performance of Sani-Brick installed by Drehmann.

Consider the advantages of converting to Sani-Brick now. A floor-wise Drehmann engineer will give you the details of how Sani-Brick can be laid right over your old worn floor with little or no interruption of production.

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Do you have the *right* scales in the *right* places? A modern *Weighing System* works hand in hand with your accounting *system* and makes a *big* difference in helping you win your war on costs. Weight records that originate at scales flow to the accounting areas and directly affect costs, inventories and customer billings. Weighing errors cannot be corrected later—weights must be right the *first* time. That's why it's more than ever important to think of weighing not in terms of isolated scales, but as a vital part of your overall cost-control system.

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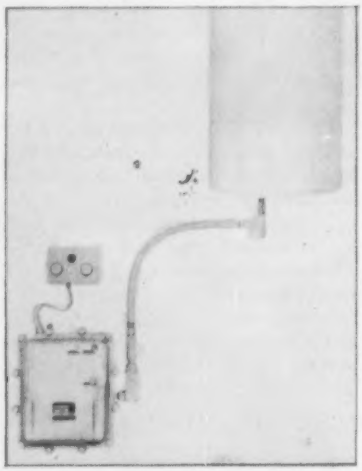


New Recorder-Controller Has Many Applications

Although intended primarily for measurement and control of levels of liquids, granular solids, interface and other conducting or non-conducting substances, this self balance recorder-controller is said to have application in a wide range of process operations.

This radio frequency capacitance bridge (Series 42) combines an accuracy of ¼% with high sensitivity and simplicity of design. Because it is of the capacitance type, the instrument may also be used for other process variables, such as moisture content or composition, which cause a direct change in dielectric constant.

Both electrical and pneumatic control forms may be incorporated within the single housing of this model. And instruments are also available in explosion-proof housings suitable for Class 1, C and D hazardous applications.

Unit consists of a capacitance bridge in which one leg of the bridge is the capacity under measurement. An opposing leg is the motor driven rebalance capacitor. Any unbalance signal is fed to a phase-sensitive demodulator and converted into a 60-cycle unbalance signal.

This signal is amplified and used to drive the servo motor in such a direction as to reduce the unbalance to zero. Radio frequency is used for the measurement to reduce the reactance of the measured capacitance to a value that is not affected by the value of leakage resistance normally encountered. And the stable bridge circuit employed permits independent adjustments of zero and span.

General specifications of the instrument: Pen speed, 3.5 sec. for full travel; range of terminal capacitance,

Armaflex . . . *flexible plastic pipe insulation that's fast and easy to apply*

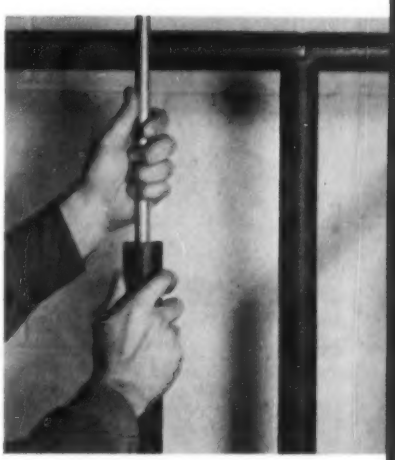
This new, foamed plastic pipe insulation has been developed especially for formed copper tubing and other types of piping that are difficult to insulate. Light in weight, Armstrong Armaflex* is so flexible it can be slipped right on pipes or tubing when they're being installed.

If the lines are already in operation, Armaflex can be slit longitudinally, snapped on the pipe, and sealed with Armstrong No. 520 Adhesive.

Armstrong Armaflex combines low cost with high efficiency. It will withstand temperatures from 32° F. to 200° F. Its foamed plastic composition is made up of uniformly sized, closed cells that make it air tight and waterproof. No vapor barrier is needed. Armaflex is manufactured with inside diameters of ⅝", ⅞", 1⅛", and 1⅜". Because of its flexibility and resilience, it will fit pipe and tubing with the same or closely corresponding outside diameters.

Armaflex is one of the many new products developed by Armstrong Research to help solve your high- and low-temperature insulation problems. **For free booklets,** with full details on Armaflex as well as the entire line of Armstrong Industrial Insulations and complete Contract Service, call your nearest Armstrong Office or write Armstrong Cork Company, 208 Stratton St., Lancaster, Pa.

*Trade-Mark



Installation is easy. Simply slip Armaflex over straight or bent tubing or pipes. Being flexible, it goes on easily over sweated couplings.

Armstrong INDUSTRIAL INSULATIONS

This "impartial panel" tells why Bud's so good!

IN their fine modern brewhouse in Los Angeles, Anheuser-Busch uses Taylor indicating, recording and controlling instruments on a variety of applications. The panel in the background of the picture shows FULSCOPE* Recording Thermometers recording mash tub temperatures.

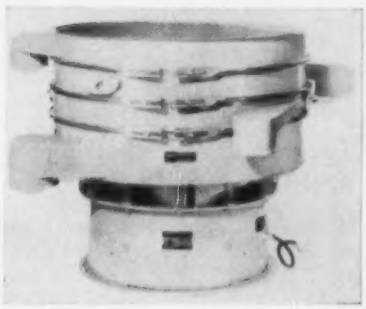
Over the years, in breweries throughout the country, Taylor instruments have helped to assure maximum yields, cut operating costs and reduce the possibility of human error. Ask your Taylor Field Engineer, or write for **Catalog 400.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Reg. U.S. Pat. Off.

Taylor Instruments MEAN ACCURACY FIRST

20 to 500 mmfd. or higher; range of span, minimum—5% of terminal capacitance or 1 mmfd. (whichever is greater), maximum—200% of terminal capacitance; sensitivity, 0.05% of span; input power, 117v., 60 cps, 18 VA.—*Robertshaw-Fulton Controls Co., 2920 N. 4th St., Philadelphia 33.*

Circle 140A on Reader Service Card



Separator Features Tangential Spouts

New tangential discharge spouts on this vibrating-screen separator, which replaces rectangular-shaped spouts set at right angles to screen decks, reportedly permit greater efficiency and speed of separation. Offered too is a broader range of materials handled —wet or dry, fine or coarse, heavy or light.

Unit shown (Sweco Model E-3D, 48-in. dia., 3-screen) is primarily a rigid body that vibrates about its center of mass. Vibration is accomplished by a combination of two eccentric weights, one on the upper end of the motor shaft, and the other at its lower end. Center of gravity of the top weight is theoretically coincident with that of the vibrating mechanism.

Therefore, rotation of this upper weight causes vibration in a horizontal plane, which is motion that does the screening. Lower weight acts to tilt the machine, thereby causing vibration in vertical and tangential planes. The angle of lead given to lower weight (ahead of upper weight) controls the relationship between radial and tangential forces acting on particles being screened. This permits variable control of the screening pattern.

Separator is completely self-contained and houses its own motor. Latter is standard 60 cycle, 3-phase, 1,200 rpm., 1-hp.—either 220v. or 440v. Also available is a series of comparable 18-in. models. — *Southwestern Engineering Co., 4800 Santa Fe Ave., Los Angeles 58.*

Circle 143A on Reader Service Card

to give you faster bag filling—less waste

T-P HI-POROSITY, HI-STRENGTH PAPERS CUT FILLING LOSSES TO A MINIMUM

Bag filling can be a quick and simple operation that moves along without a hitch. Or it can be an expensive headache of torn bags, spillage and poor efficiency.

To give you just the bag your operation calls for, Thomas Phillips' paper experts spend considerable time studying the various bag filling processes.

By fully acquainting themselves with actual on-the-job conditions, Thomas Phillips' engineers have developed extra strong sacks that can take large quantities fast without tearing. They have greatly increased porosity to reduce powder, cement and flour filling losses. In fact, whatever your filling problems, you should talk with Thomas Phillips' experts; chances are they have the answers.

Thomas Phillips is a fully integrated paper mill—from pulp to finished product. They can furnish shipping sacks of every type and size—one to five walls. Send for free literature illustrating complete line.

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OAKITE HIGHLITE

for

CLEANING AND BRIGHTENING

your copper and stainless steel

PROCESSING EQUIPMENT

When it comes to removing stains and discoloration from your copper and stainless steel processing equipment *without scratching*, try Oakite Highlite. An amazing new material, possessing an effective combination of detergent, wetting-out and extremely mild abrasive properties—it really works wonders. Merely apply with a damp rag, brush or sponge . . . and you'll see that even the most stubborn stains disappear like magic after a few passes.

Oakite Highlite is easy to use. It is neither toxic nor hazardous. It will prove a real time-and work-saver that will do a superior job for you every time . . . at surprisingly low cost. Equipment cleaned and brightened with Oakite Highlite retains its immaculate appearance much longer than when ordinary cleaners are employed. Darkening or retarnishing is definitely deferred.

Special Service Report gives further particulars. It's yours free for the asking. Just drop us a line today. Or, if you prefer, see your nearby Oakite Technical Service Representative. No obligation. Oakite Products, Inc., 26G Rector Street, New York 6, N. Y.

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SCIENCE

Technical Service Representatives in Principal Cities of U. S. and Canada

Equipment & Supplies

Tough Conveyor Belting Resists Heat and Oil

To carry a variety of unwrapped foods—potato chips, hot baked goods, fresh fish, and salted nuts—this belting is designed to withstand heat and grease.

Called Style ROH, it is made of closely woven duck impregnated with Hycar. Plies are laminated and a white 1/32-in. cover is applied, press-cured, and vulcanized. Special processing is said to prevent peeling and stretching.

Smooth surfaced, waterproof and chemically inert, this belting does not retain food particles or contaminate products. It can be washed with live steam, or soap and hot water, withstands up to 250 F. sustained heat (325 F. intermittent), and is highly flexible.

Belting is available in two-, three-, and four-ply thicknesses and in widths up to 48 in.—*Victor Balata & Textile Belting Co., 53 Park Place N. Y. C. 7.*

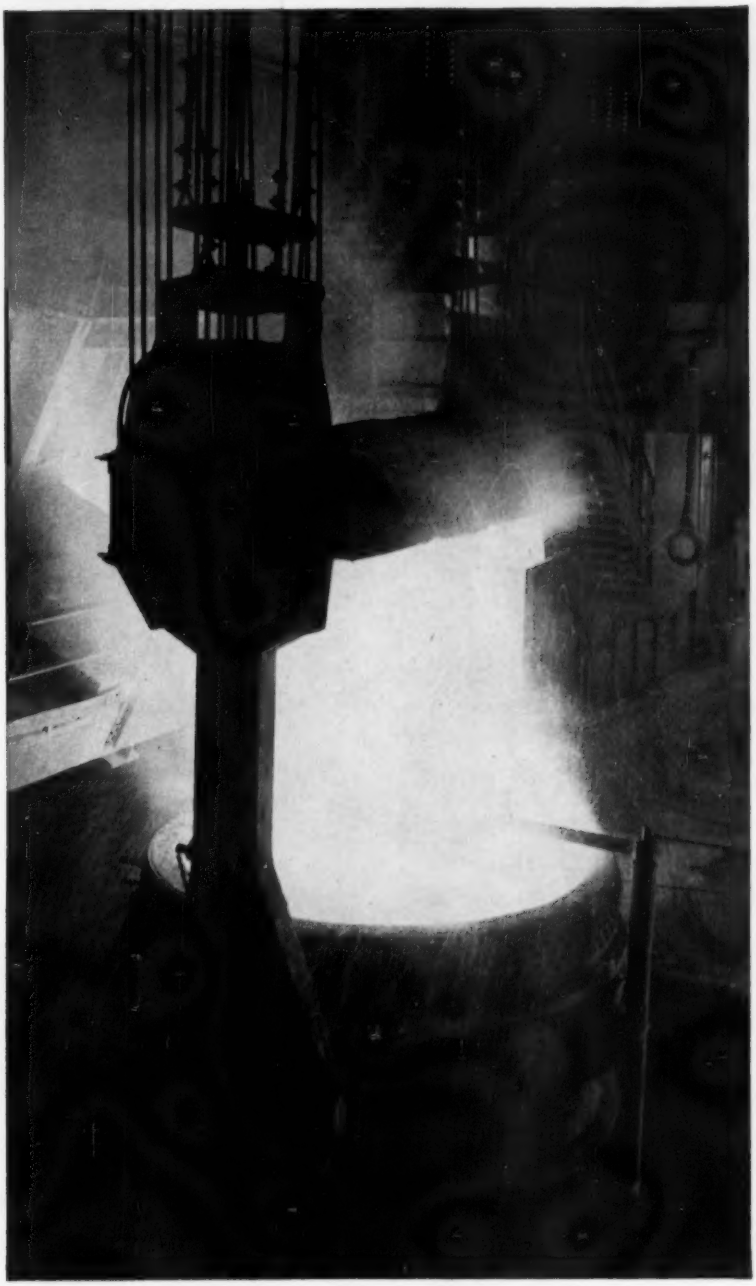
Circle 144A on Reader Service Card

Separate Motor Drive Is Highly Flexible

A variable-speed transmission, which can be coupled to any foot-mounted motor through a flexible coupling and mounting shaft, is now supplied as a separate motor drive.

Called Speed-Trol, it is available with separately mounted explosion-proof motor for hazardous areas, as

We make our own fine alloy steel — and make it nickel-rich — to make TIMKEN® bearings tougher



NICKEL makes steel tougher. So, our steel-making specialists don't skimp on nickel in the fine alloy steel we make for Timken® tapered roller bearings. They use exactly the right amount of nickel to give these bearings the toughness they need to withstand shock and last longer. Exacting quantities of chromium or molybdenum or both guarantee uniform hardness. By using the steel industry's first direct-reading spectrometer, we exercise hairline control of each element at the precise instant of tapping the furnace.

Rolling, annealing, and cooling are done with the same meticulous care. And every race and roller that goes into a Timken bearing is precision case-carburized to give it a hard, wear-resistant surface over a tough, shock-resistant core.

We've been specializing in the production of fine alloy steel for almost forty years. We're the only bearing manufacturer in the country that makes its own steel, because it's the only way we can make sure the quality of our bearing steel is just the way we want it. Steel is the heart of the bearing. That's why we insist on controlling bearing quality *every* step of the way—from melt shop to final bearing inspection. And that's why we don't skimp on the use of nickel.

To be absolutely sure of the highest performance standards in the equipment you build or buy, always specify Timken tapered roller bearings. They are made from seamless tubing or forgings by the most modern processes, under strict control. Only Timken bearings roll so true, have such quality thru-and-thru. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

Only TIMKEN® bearings roll so true, have such quality thru-and-thru

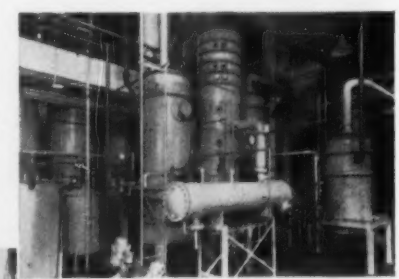
For more information, use coupon on last page.

SOLUBLIZED *Pepperoyal*®

Hi-Fi Flavor

In seasonings, as in recorded music, "HI-FI" denotes a definite and enjoyable difference in quality.

Compare Griffith's Solublized PEPPEROYAL with any soluble pepper. Compare it for purity of flavor! . . . for potency of flavor! . . . for uniformity of flavor! You'll find the flavor of PEPPEROYAL exceptional—constantly and exclusively "HI-FI" in quality. That's an important advantage to you as a user.



"High Fidelity" Flavor naturally comes from prime quality spices. But, its real distinctiveness originates here with The Griffith Laboratories' exclusive process of controlled flavor extraction.

THE *Griffith* LABORATORIES, INC.

In Canada—The Griffith Laboratories, Ltd.

CHICAGO 9, 1415 W. 37th St.
NEWARK 5, 37 Empire St.
LOS ANGELES 58, 4900 Gifford Ave.
TORONTO 2, 115 George St.

Laboratorios Griffith do Brasil, S. A. — Caixa Postal 300 Mogi das Cruzes, Est. S. P., Brasil

well as drip-proof and totally enclosed motors. Unit has fingertip speed-change control, positively displaced variable-pitch pulleys, and compact, rugged frame with rotating parts mounted between widely spaced bearings.—*Sterling Electric Motors, Inc., 5401 Telegraph Rd., Los Angeles 22, Calif.*

Circle 1448 on Reader Service Card

Sanitary Filter Employs Quick-Opening Clamp

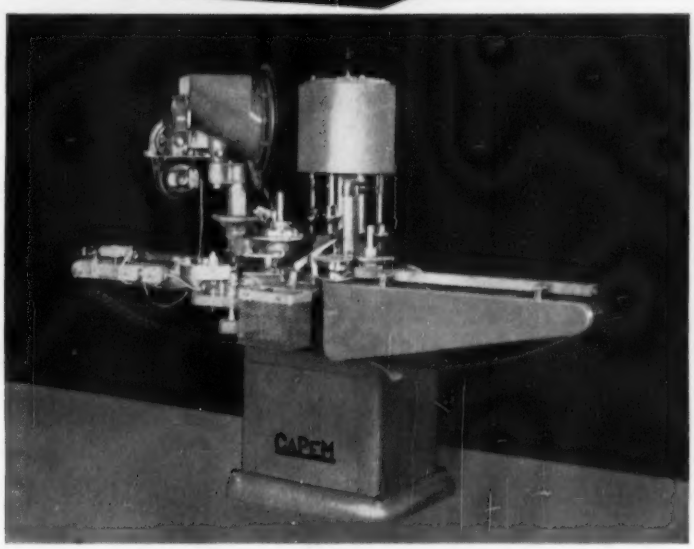
To simplify operation, this filter is equipped with a quick-opening adjustable clamp. Furthermore, all-stainless sanitary construction eliminates corrosion and uptake of metallic flavor, and eases cleaning.

Known as Model DX, its high capacity is obtained through use of plates and disks—each serving as an individual filter operating in parallel. Product is evenly distributed over the entire filter area. Bellows action of spring-type clamping plates provides positive seal of the filter media and eliminates internal threads.

Liquid flow is up through a central standpipe, out through three small holes in the plate collars, and into the space between filter plates. Product then leaves the filter plates through holes in the outer circumference and flows up to filter outlet. Because flow is from the bottom up, there is no chance of unfiltered material mixing with filtered product. Unit is self-draining and simple two-piece construction of flush valve eliminates pockets.

IF PACKAGING COSTS ARE SKYROCKETING

CAPEM SCREW CAPPERS WILL BRING THEM DOWN



More CaPeM Automatic Screw Cappers are in use than any other make. And for very good reasons. They combine low initial cost, low operating cost and a minimum of maintenance expense.

MEET EVERY PACKAGING REQUIREMENT

Eight standard CaPeM models accommodate a broad range of standard sizes and shapes of both containers and caps, as well as a wide variety of flexible molded closures of the CT type, both in combination with polyethylene squeeze bottles and otherwise.

In addition, advanced types of CaPeM machines are adapted for sorting, feeding and applying Wheaton and similar type closures, Kimble-type polyethylene plugs, polyethylene fitments, corks, etc., and in combination with a wide variety of secondary closures.

CaPeM is fully automatic . . . delivers a uniformly dependable seal . . . handles bottles, cans, jars and jugs from 2 ozs. to gallons . . . applies all types of metal and plastic screw caps . . . is easily synchronized with all standard types of related equipment.

Write for specifications and the name of your nearest Consolidated representative. You'll find his broad experience with all types of packaging problems helpful.

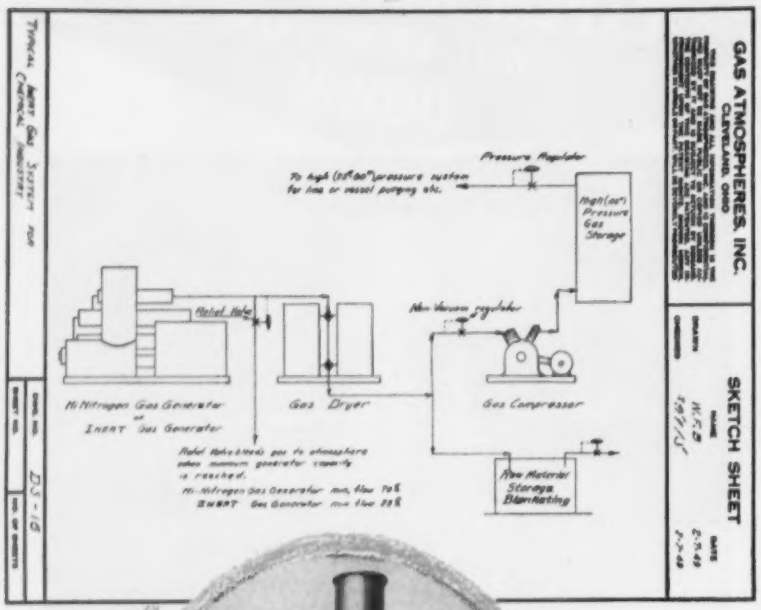
CONSOLIDATED PACKAGING MACHINERY CORP.

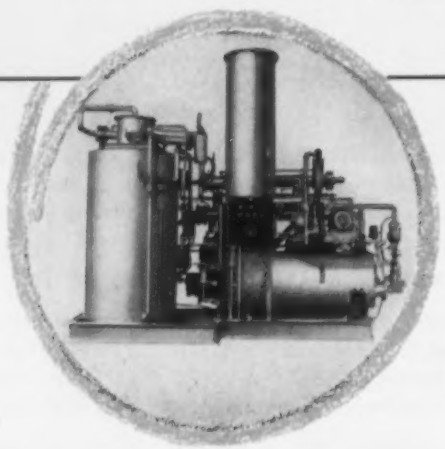
1400 West Ave., Buffalo 13, N. Y.

For more information, use coupon on last page.

BETTER CANNING BEGINS HERE

More progressive canners every day are turning to inert gas packaging as the surest, most efficient method of modern food canning.


GAS ATMOSPHERES, INC.
CLEVELAND, OHIO
SKETCH SHEET
Pressure Regulator
To high (25 lbs) pressure system for line or vessel purging etc.
High (air) Pressure Gas Storage
Relief Valve
Gas Dryer
Gas Compressor
Hi Nitrogen Gas Generator or INERT Gas Generator
Relief Valve heads pop to atmosphere when maximum generator capacity is reached.
Raw Material Storage Blanketing
DS-16



The plan and generator shown here are saving thousands of dollars for a leading food canner.* And he reports higher product quality.

***Name furnished on request.**

Gas Atmospheres Inc. is one of the leading producers of gas generation and gas purification equipment for the food packaging industry. Regardless of amounts of gas required, Gas Atmospheres' engineers and packaging experts can show how you can save the cost of the equipment in the first year by generating your own gas. Fully acquainted with the needs of the food packaging industry, Gas Atmospheres will design a complete, packaged layout tailored to exactly suit your job requirement. Why not talk modern packaging and the application of inert or nitrogen gas with a Gas Atmospheres engineer. There's no obligation. Simply let us hear from you.

gas Atmospheres, inc

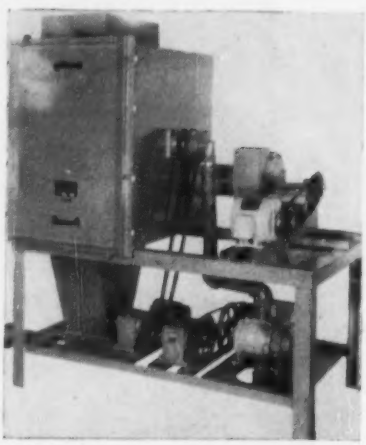
equipment for producing industrial gases

20011 WEST LAKE ROAD CLEVELAND 16, OHIO

Equipment & Supplies

Also offered for pipeline installation is a readily portable unit (Model EX). Construction is similar to that of the larger model. Because of the fewer number of plates, a shroud nut tightened on a threaded standpipe clamps the filter media. This nut holds the plates together by bearing on the bevel collar of the top plate. A sanitary cap and nut seal off the top of the standpipe to prevent by-passing.—*W. M. Sprinkman Corp., 4022 N. Port Washington Ave., Milwaukee 12.*

Circle 147A on Reader Service Card



Versatile Dust Collector Has Air-Jet Cleaner

High efficiency, economy, and compactness are advantages of this line of self-cleaning dust collectors, capacities of which vary from 520 to 7,200 cfm.

Called Model D Aeroturn, units house a number of filter drums. Two heads of each drum are felt filters, stretched tight for increased capacity and efficient cleaning.

In operation, dust-laden air from a manifold enters through the drum heads, deposits dust, and is drawn from the housing by the main blower. Dust is dislodged by a reverse-air jet and falls through a slot (in the drum bottom) to an automatic screw conveyor. The cleaning cycle depends entirely on the dust loading.

A static-pressure actuated switch automatically controls operation of the air-jet cleaner. As dust accumulates on the filter and pressure drop increases, the switch automatically starts the cleaning device. When sufficient dust is removed to return pressure drop to normal, it shuts the apparatus off.—*Turner & Haws Engineering Co., Boston 32.*

Circle 148A on Reader Service Card

Electronic Air Cleaning vs. Air Filtering?

Fact:

Test Proves Westinghouse PRECIPITRON®
Removes Over 5 Times More Airborne Dirt

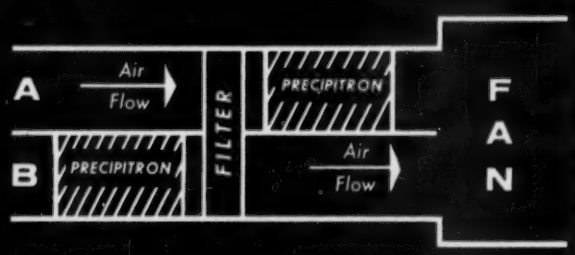


FIGURE 1

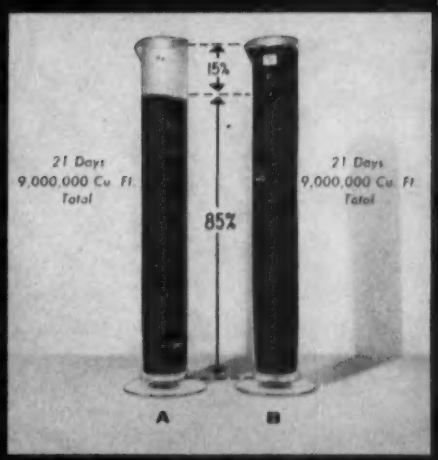


FIGURE 2

Dirt scraped from PRECIPITRON cells

How much better is PRECIPITRON Electronic Air Cleaning for removing dirt particles from air for ventilating and air conditioning? The answer is shown by this dramatic research test, comparing the performance of a conventional mechanical air filter with PRECIPITRON.

In the test, equal quantities of outdoor air were drawn through two identical channels as shown in Figure 1. In Channel A, air was first filtered and then PRECIPITRON-cleaned. A duplicate filter was placed in Channel B after the PRECIPITRON to balance the air flow. It did not retain any measurable amount of dirt.

After 21 days of operation, a total of 9,000,000 cubic feet of air had passed through each channel. The accumulated dirt was recovered from the PRECIPITRON collector cells in each channel, and carefully weighed.

In Figure 2, Column B indicates amount of airborne dust and dirt removed by the PRECIPITRON. In Channel A (*shown by Column A*), **only 15% of the dirt was removed by the mechanical filter.**

85% passed through and was trapped by the PRECIPITRON—over 5 times as much, and that portion contained damaging submicroscopic particles.

MORE FACTS?

Call your nearest Westinghouse-Sturtevant Sales Engineer . . . he's the "Man with the Facts" on electronic air cleaning . . . or fill in the coupon below.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S

Westinghouse

J-80442

Westinghouse Electric Corporation
Sturtevant Division, Dept. 17E
Hyde Park, Boston 36, Mass.

Please send more facts on your PRECIPITRON.

NAME AND TITLE .....

COMPANY .....

CITY ..... STATE .....

For more information, use coupon on last page.

New! Patented! Reversible Superstructure

Another Famous Hammel-Dahl First

Now Possible—

TREMENDOUS SAVING OF REVERSAL TIME
(Only 7 Minutes Required)

- Superstructure Remains in Place
- Plug Stem — Spring Stem Coupling Undisturbed
- Body Stays in the Line

CONSOLIDATION OF SPARE PARTS

- Direct and Reverse Topworks Identical
- Plugs Pinned to Seat Upward or Downward as Required

COMPLETE Information in H-D Bulletin 109-B

HAMMEL-DAHL COMPANY

175 POST ROAD, (WARWICK) PROVIDENCE 5, R. I., U. S. A.

SALES OFFICES IN ALL PRINCIPAL CITIES

MANUFACTURING PLANTS IN WARWICK, R. I., U. S. A., CANADA, ENGLAND, FRANCE AND HOLLAND

CANADIAN MANUFACTURING AFFILIATE—GUELPH ENGINEERING CO., GUELPH, ONT.

New Chemicals

Chlorinated Detergent Has Multiple Action

For cleaning, deodorizing, and sanitizing in one operation, this chlorinated detergent is said to provide 140 ppm. of available chlorine at concentrations of ½ oz. per gal. of water.

Called "Chlor-tergent," it is readily soluble in cold or warm water and may be applied by brushing, swabbing, or circulation. Detergent quickly penetrates and dissolves protein and inorganic soils. Furthermore, its chlorine content remains stable even at high temperatures.

Forming no suds in solution, this material is recommended for in-place cleaning and sanitizing, since it produces no pockets in pipelines during circulation. It may also be used as a sanitizing agent alone on pre-cleaned equipment before processing is resumed.

Recommended solutions are termed safe to personnel and metal, rubber, or plastics.—*Oakite Products, 19 Rector St., New York City.*

Circle 151A on Reader Service Card

Effective Fumigant Mix Cuts Application Cost

As a space fumigant for controlling pests in grain, flour, rice, cheese and dried fruits, the combination of ethylene dibromide and methyl bromide reportedly is more effective than either one alone.

Mixture of both constituents, called "Bromotox," produced 100% mortality in 48-hr. fumigation test. On the other hand, pest mortality for ethylene dibromide in same test was about 72%, while that for methyl bromide about 65%. Because of its effectiveness, this material may be used at reduced dosages—thus lowering application costs.—*American Potash & Chemical Corp., 122 E. 42 St., New York City.*

Circle 151B on Reader Service Card

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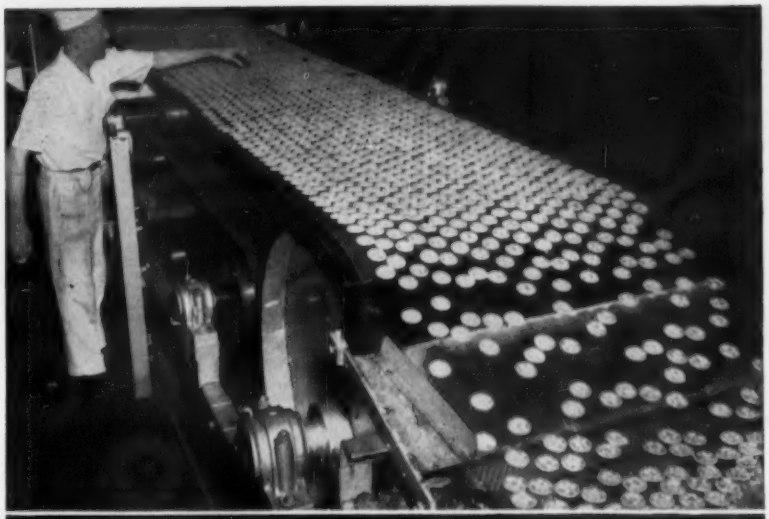
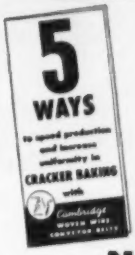


FEWER BURNED CRACKERS

WITH *Cambridge*

WIRE MESH CONVEYOR BELTS



Regardless of what you're baking, you'll get a more uniform product by seasoning, baking, cooling, packaging at controlled speed on continuously moving wire mesh belts. Open mesh provides uniform heat distribution and free circulation for cooling . . . eliminates sticking. Write for detailed discussion of how Cambridge Wire Mesh Conveyor Belts can speed production by minimizing manual handling.

No matter what food or process . . .

. . . canning, freezing, baking . . . meat, poultry, candy, fruit or produce . . . Cambridge Wire Mesh Conveyor Belts can reduce your operating costs and increase product quality by continuous uniform processing with reduced manual handling. Lifelong rust-protection, quick drainage of process solutions, lack of odor and freedom from contamination are only a few advantages. All-metal belt is impervious to damage from heat and cold. There are no sharp edges because Cambridge belts are woven from round wire.

Cambridge Wire Mesh Conveyor Belts are made in any size, mesh or weave, and from any metal or alloy. Special raised edges or cross-mounted flights to hold your product during movement are available.

Call in your Cambridge Field Engineer to discuss how you can cut food processing costs by continuous operation. You can rely on his advice. Write direct or look under "BELTING, Mechanical" in your classified telephone book.

ASK FOR FREE 130-PAGE REFERENCE MANUAL illustrating and describing wire mesh conveyor belts. Gives mesh specifications, design information and metallurgical data. Ask for Special Industry Folder on your operation.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

DEPARTMENT Q, CAMBRIDGE 6, MARYLAND

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

For more information, use coupon on last page.

Use

RHOZYME

Diastatic Enzymes

for processing starch in food

You can solubilize, saccharify, or modify food starches *without* altering other ingredients by using low-cost, efficient RHOZYME diastatic enzymes.

For example: In the processing of precooked cereals, diastatic enzymes can be used to reduce the viscosity of the mash and thereby increase the efficiency of roller-drying. Sweet, nonbitter sirups can be produced by saccharifying corn or wheat starch. Bread starch, modified by treatment with RHOZYME enzymes, gives bread of better texture and grain.

If you want to improve the processing of your starch-containing foods, we will be glad to discuss with you how the *specific* and *controlled* action of RHOZYME enzymes can help.

RHOZYME is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

Write Department SP for full information

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

New Chemicals

Chemically-Resistant Paint Solves Odor Problem

Excellent resistance to acids, alkalies, and cleaning agents is cited for this line of odorless paints, which provide good coverage and adhesion to primers and old paint.

Especially recommended is its use in food plants where odor problems, caused by chemically-resistant painting, interfere with production or cause shutdown for weekend painting. Furthermore, low-temperature resistance makes this material suitable for use in cold storage and refrigerator areas, where poor ventilation presents special problems of vapor and odor removal.

Paints are easily applied to wood, metal, or concrete and are scrubbable after 24 hr.—*Prufcoat Laboratories, 50 E. 42 St., New York 17.*

Circle 152A on Reader Service Card

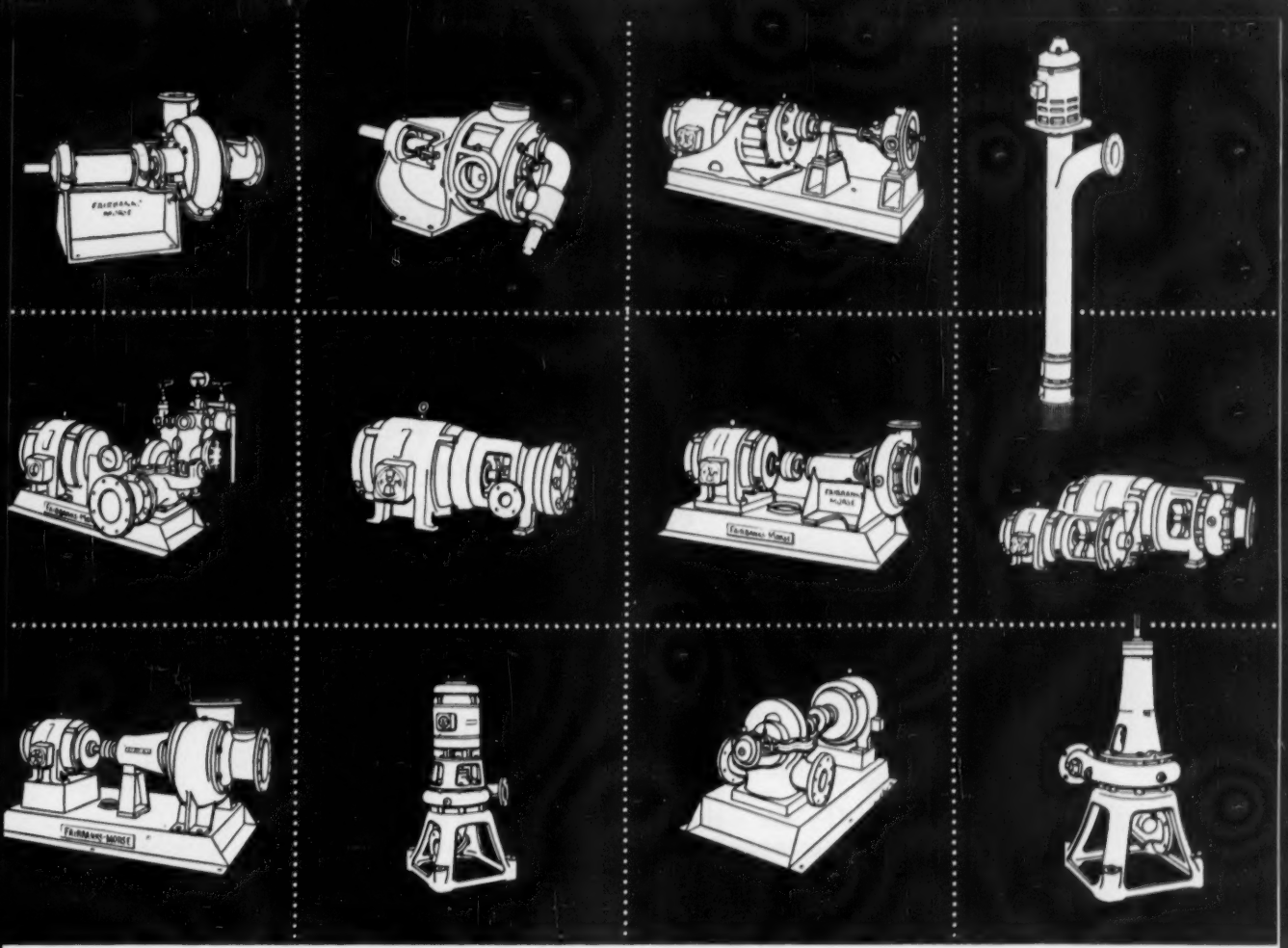
Briefs . . .

Laboratory Dispersion Mill handles products such as purees, juices, mayonnaise, ice cream mixes, and flavors. Solids in a liquid carrier, accelerated by a rotor within a cylindrical slotted stator, impinge against slots for effective dispersal without shear. Unit's capacity is ¼-½ gal.—*Kinetic Dispersion Corp., 95 Botsford Place, Buffalo, N. Y.* (152B)

Baker's Box of hard vulcanized fiber has perforated holes in bottom and on all four sides for free air circulation. Top channel is of heavy-gage, rust-proof steel. Metal-reinforced corners are mounted on hardwood runners. Inside dimensions: 24x20x8 in. —*Federal Fibre Corp., 3704 Tenth St., L. I. City, N. Y.* (152C)

Semi-Works Spray Dryer furnished as complete operating unit includes heater, spray nozzle, product collector —all in stainless—and external bracing. Eye-level observation port provides easy inspection during operation. Cleanout door makes unit accessible for sanitation. Space required is about 9x7 ft.— *Bowen Engineering, Inc., Station Ave., North Branch, N. J.* (152D)

High-Nickel Alloy called Nionel is now available. Cited is its excellent resistant to strong acids, oxidizing chemicals, and salt-water pitting.— *International Nickel Co., 67 Wall St., New York 5.* (152E)



YOU CAN RELY ON YOUR F-M PUMP ENGINEER...

to solve any pump problems!

Troubled by a pumping problem? There's an easy solution. Call your Fairbanks-Morse Field Engineer. His business is solving your problems . . . selection and applying pumps that will answer your needs most economically and efficiently.

Because Fairbanks-Morse is the world's largest manufacturer of a complete pump line, your Fairbanks-Morse Field Engineer is not handicapped in his recommendations. He can select the pumps that offer you the most for your pump dollar. He has the field experience and is backed by the most experienced pump engineering department in the business. To solve your pump problems, call your Fairbanks-Morse Field Engineer. Fairbanks, Morse & Co., Pump Division, 3601 Kansas Ave., Kansas City, Kansas.

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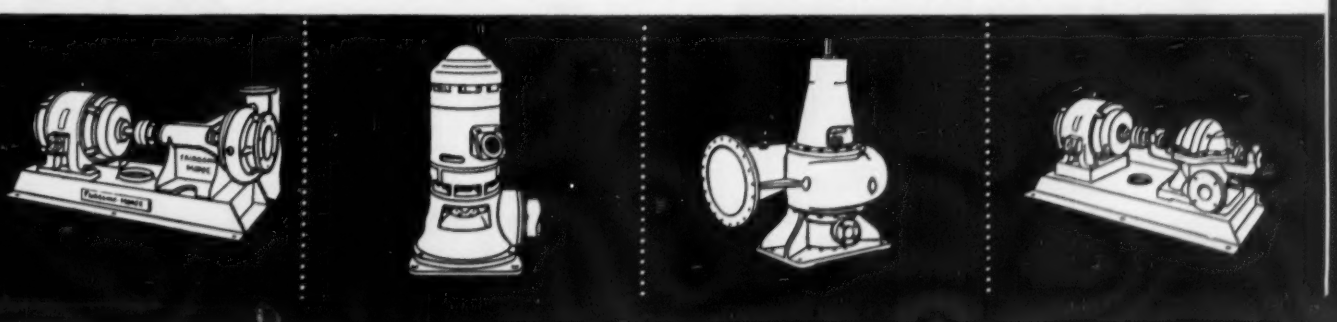
a name worth remembering when you want the best

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS



NEW STANODIESEL OIL M

A new stationary industrial engine lubricant developed specifically to meet problems posed by new engine designs, higher loads, economy fuels

New STANODIESEL Oil M meets—and with plenty to spare—the performance requirements imposed on diesel lubricants by new engine designs, higher loads and the use of economy fuels. It meets these requirements because, first of all, it is an oil refined from the finest quality base stocks. It thus has superior stability. Then additives exclusive with STANODIESEL Oil M have been blended with these base stocks. The additives do these things:

1	**INHIBIT OXIDATION.** Prevent unwanted increases in oil viscosity. Prevent corrosion of bearings.
2	**PROVIDE DETERGENT-DISPERSANT ACTION.** Keep crankcase, pistons, cylinder walls and other parts clean. Keep contaminants in suspension, prevent redeposit.
3	**PROVIDE ANTI-FOAM ACTION.** Foaming tendencies of oil are controlled. Oil is suitable for use in hydraulic governors.
4	**INCREASE LUBRICITY.** Wetting agent increases oil's ability to reach and maintain a film on highly stressed parts.

STANODIESEL Oil M is a "Mil" type oil.

Your next move? Find out how STANODIESEL Oil M can serve you. In the Midwest call your nearby Standard Oil lubrication specialist. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANODIESEL OIL M
Does these things for your engine

1. Lessens engine deposits, ring and cylinder wear.
2. Lessens spark plug fouling.
3. Lessens fuel injector and pump sticking resulting from engine deposits.

STANDARD

STANDARD OIL COMPANY (Indiana)

Radiant Cooling Results

—Continued from page 63

pieces may be different or identical.

Here, then, are two assumptions that can be made:

1. Radiation takes place only from the surface, as in the generally accepted theory.

2. Wave lengths and substance involved are such that the material is transparent to radiant energy.

As distance "L" between the bodies is reduced and "B" approaches "A", exchange of radiation between (or through) the bodies remains unchanged. When distance "L" is reduced to zero and the bodies are in juxtaposition, in effect is one substance with radiant emission from the center.

Examples of the transparency of substances to various wave-lengths are manifold—most common is the penetration of solar energy through air and glass. In general, short wave-lengths will be absorbed at the surface of the material (such as the browning of baked goods or toasting of bread), while long wave-lengths will be absorbed inside the material or pass through completely. Since low temperature is commonly associated with longer wave-length, it can be assumed that cooling operations conducted in the range of temperatures below 200 F. are more likely to be attended by interior radiations.

Radiant Cooling Tunnel

Now let's consider the major features of a radiant cooling tunnel. It would be a simple matter to place a water-cooled plate in a horizontal position directly above the product on the conveyor belt. Such a design, however, would usually result in condensation forming on the plate and dripping on the product.

Condensation is overcome by the use of reflective surfaces as illustrated in Fig. 4—basic feature of the tunnel design employed by Reflectotherm, Inc., and on which patent application has been made. Chilled plates, through which water is circulated, are mounted in a vertical position along each side of the belt. A scientifically-designed reflector over product insures all radiant energy going out directly or reflecting to the chilled plates. Since the reflector merely serves as a mirror, its temperature is not reduced below the dewpoint and no condensation occurs on it.

Provision is made for draining condensate from chilled plates. Tunnel is constructed to gain, in a matter of seconds, easy access for inspection or cleaning. Where forced convection is not employed, a radiant tunnel can operate more economically, since there is no load imposed by make-up air.

Materials that crystallize when cooled, such as chocolate, can be considerably affected by radiant cooling. If internal radiation can remove the heat of fusion without regard to surface conditions, heat transfer will be more rapid, crystal size smaller, gloss enhanced, and product more stable. Materials subjected to distortion due to the thermal stress of steep temperature gradients may also be improved by radiant cooling.

Potential application of radiant cooling in the food industry is very great. By using good judgment and applying all the forces of nature available, the food engineer can show considerable savings in first cost, operating cost, and maintenance and can improve the quality of the product—a hard-to-beat combination.

End (Resume reading on page 64)

Unique Infant Food Plant

—Continued from page 73

containers and moved to the capping station.

Filling units are specially designed for this purpose. They may be adjusted to deliver ½ to 8 oz. per bottle. Three filling units have from 2 to 12 filling spouts. The 2-spout units are normally used for filling special formulas; the 12-spout for standard types. The latter fills baskets of 12 bottles. To control quantity, a knurled wheel is turned to the proper calibration.

In operation, baskets are positioned below the spouts, then elevated by foot pedal until the spouts enter the bottle necks. The operator then trips the valves by hand. The baskets of filled bottles move by conveyor to the capping station.

Capping and Identification

House Formulas: Standard hospital formulas, in most cases, are compounded of similar ingredients. Many hospitals provide a house formula for premature infants. Orders indicate the type of nipple hole desired, and the color of the nipple identifies the size of the hole.

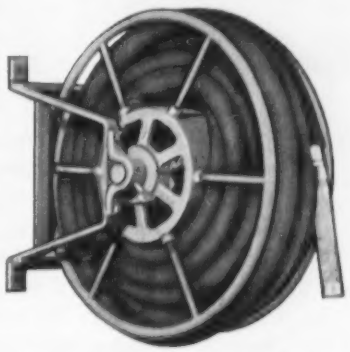
A wide-necked bottle is used, with nipple in upright position. A stiff paper hood protects the nipple and also provides a color code identification for the bottle contents.

Special Formulas: These are prepared to individual prescription for infants not using house formulas. Infant's name is marked on protective paper hood.

need a snake charmer?

not if you keep your hose on

WIRT & KNOX WASHREELS



Your costly wash up hose will last much longer if properly drained and coiled. The Washreel offers both these services and many more. To name a few . . .

√ Piped up permanently to your water line or mixing valves.
√ Eliminates handling of bulky coils of hose.
√ Keeps hose off the floor and out of the way of traffic.

Write us today for special details.

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